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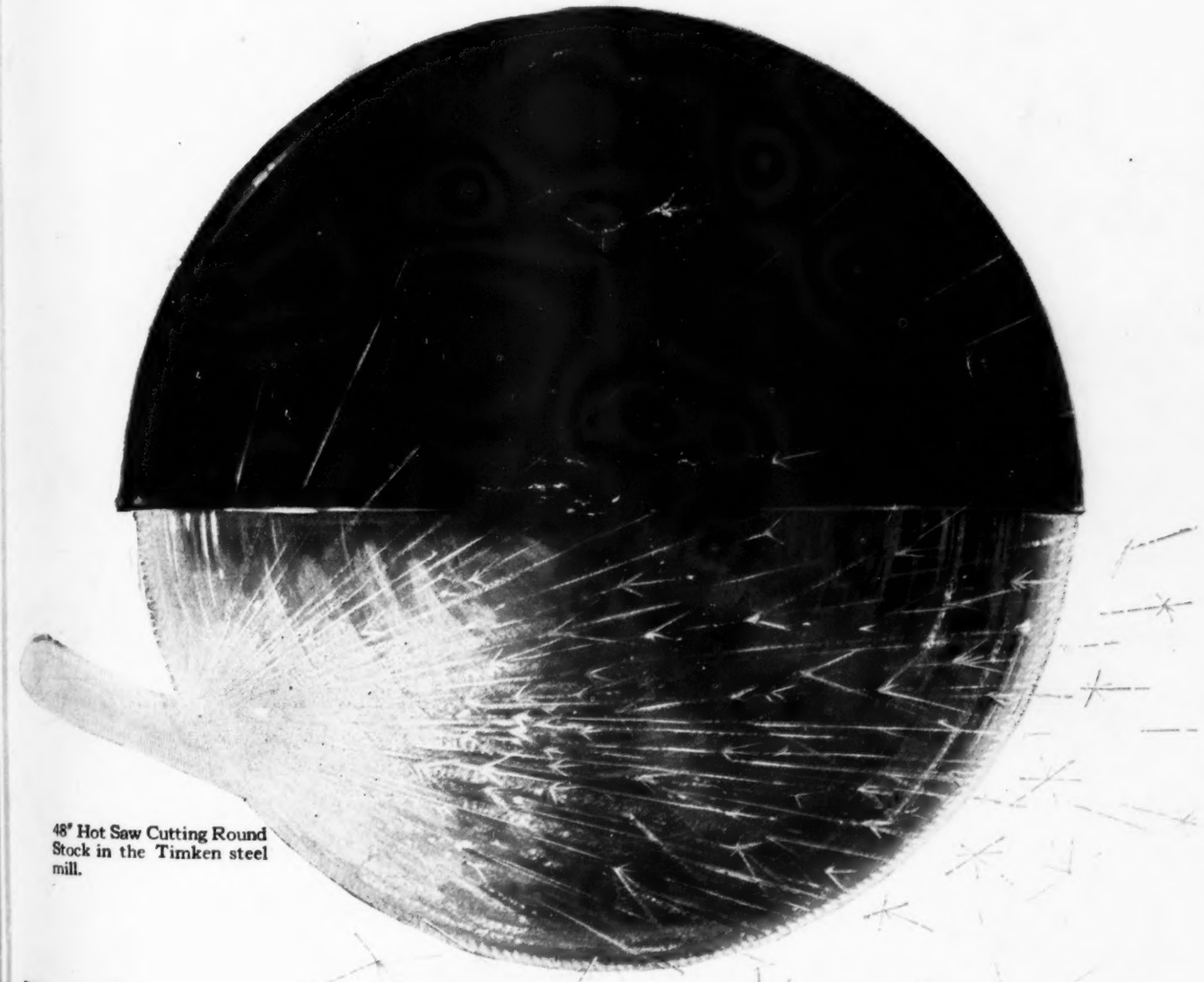

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AUTOMOTIVE INDUSTRIES
VOLUME 54 *Philadelphia, Thursday, April 29, 1926* NUMBER 17

Canadian Tariff Cut Beneficial to U. S. Industry as a Whole

Manufacturers owning Canadian factories are left in uncertain position, but others, who are in the majority, have everything to gain and nothing to lose.

By Norman G. Shidle

THE sweeping changes in the Canadian tariff on automobiles came suddenly and as something of a surprise, despite the long period of discussion and argument which had preceded the announcement of the new rates in the budget speech delivered by the Minister of Finance to the Canadian House of Commons on April 15.

With that speech came a definite knowledge of what the future tariff is to be; but factory executives still are sharpening pencils and covering white paper with multitudinous figures to discover exactly what the change means in terms of Canadian sales and Canadian manufacturing operations.

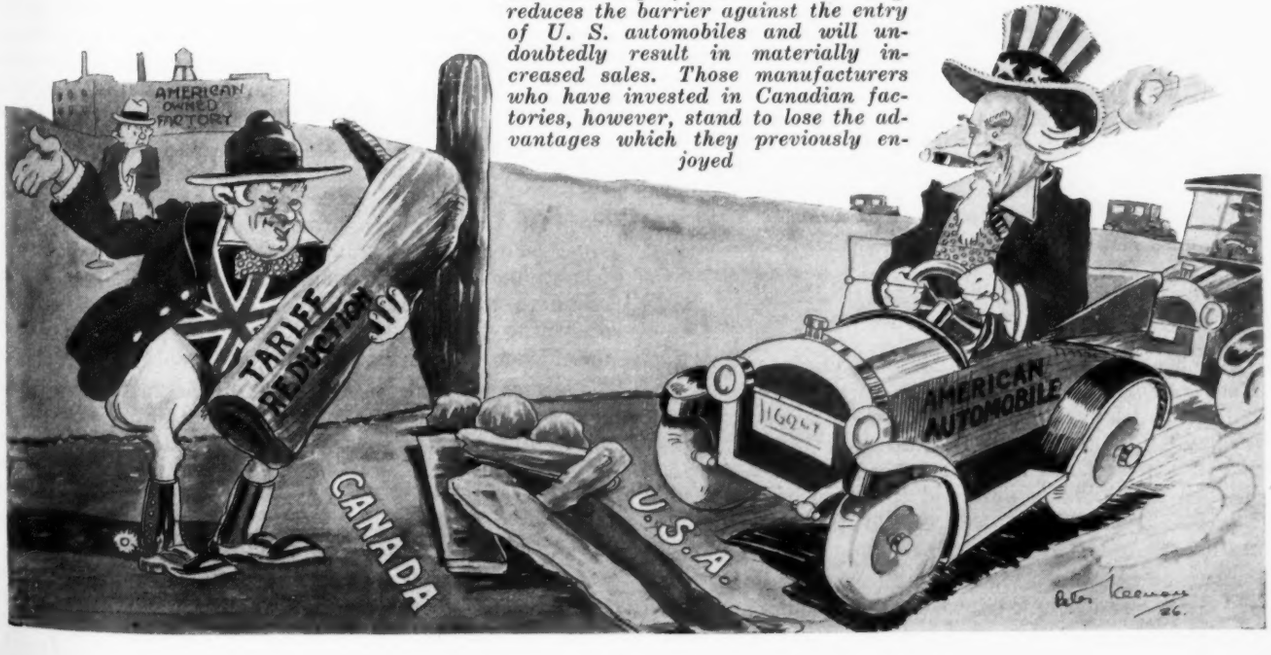
First results of the figuring already have materialized in the form of reductions in Canadian retail car prices. Ford, Essex, Hudson, Overland and Willys-Knight and General Motors were the first to announce the new lists and others have been coming through since.

Viewed from the standpoint of the United States automotive industry as a whole, the Canadian tariff reduction seems certain to bring a great preponderance of benefits over harm. Immediate losses undoubtedly will be suffered in certain respects by those manufacturers who have been operating Canadian factories, but they are in a minority from a numerical standpoint and, it begins to appear, their losses in some cases may not turn out to be so serious as was thought at first.

Viewed from the Canadian industrial angle, of course, there are few bright spots in the reduction. The Canadian automobile buyer, on the other hand, has reason to be pleased with the reduced schedules as they will make it possible for him to buy automobiles considerably cheaper than in the past.

It will be some time, however, before all of the possible effects of the decrease become fully recognized. Some of the more important probabilities become apparent, nevertheless, from an examination of the existing situation.

Last year Canadians bought at retail something like



The lowering of the Canadian tariff reduces the barrier against the entry of U. S. automobiles and will undoubtedly result in materially increased sales. Those manufacturers who have invested in Canadian factories, however, stand to lose the advantages which they previously enjoyed

Facts About the New Canadian Tariff

Products	Old Tariff			New Tariff		
	General	Intermediate	British Preferential	General	Intermediate	British preferential
Passenger automobiles (valued at retail with standard equipment complete, at not more than $1200 each); and motor cars or motor trucks (not for railways or tramways) for carrying goods only; and motorcycles....	35%	27½%	22½%	20%	17½%	12½%
Automobiles and motor vehicles of all kinds, not specified	35%	27½%	22½%	27½%	25%	15%

The general tariff rate is the only one of direct interest to United States' manufacturers. The intermediate rate applies only to those countries with which Canada has some special reciprocal tariff agreements, while the preferential rate applies only to goods shipped from Great Britain from a British colony.

The tariff is based on the retail price in the United States, that price to include the 3 per cent excise tax which has to be paid to the United States Government.

Canadian automobile manufacturers will be granted a drawback of 25 per cent of the duty paid on materials imported for use in the manufacture of automobiles provided at least 50 per cent of the cost of the finished vehicle is produced in Canada.

The Department of Customs in Ottawa has issued a bulletin stating that automobile tops, wheels, chassis and complete bodies can now be imported into Canada under the new duties. This means that these products up to $1200 retail value are subject to an import duty of 20 instead of 35 per cent, general tariff covering imports from the United States, 12½ per cent British preferential tariff and 17½ intermediate tariff on products from France, Belgium and certain other European countries with which Canada fixes rates by treaty. On parts imports above $1200 retail value general tariff is 27½ per cent, British preferential 15 and intermediate 25 per cent.

These reduced duties on parts were put into effect although the Minister of Finance in announcing the lower duties on cars had no intention of applying the reductions to parts.

As the Canadian customs officials said that the issuance of the bulletin reducing rates on parts was a mistake, but that the bulletin had the effect of making the reductions effective. It is possible that the Government may work out a plan by which the bulletin may be recalled or the reductions otherwise cancelled.

$115,000,000 worth of passenger cars and trucks. About 99 per cent of this total was paid for vehicles built either by manufacturing plants in the United States or by Canadian plants controlled by U. S. companies. At the beginning of 1926 Canada had in operation nearly 720,000 motor vehicles, of which about 645,000 were cars and about 75,000 trucks. It now has one motor vehicle for every 12 persons.

Canada is an important and easily accessible market for the automotive products of this country. For that reason alone important tariff changes there are of considerable significance to our domestic industry; additional significance is added by the fact that a number of U. S. companies have established manufacturing and assembly plants in Canada during the last decade, operation of the plants being feasible chiefly because of the 35 per cent tariff imposed on direct imports from the United States.

From the standpoint of the U. S. automotive industry as a whole, the possible results of the Canadian tariff reduction must be considered in two main divisions, namely, the effects on those companies which have had manufacturing facilities in Canada and the effects on those who have not.

Obviously, those companies which have not had manufacturing plants in Canada have nothing but good to receive from the downward revision of tariff schedules. The greatest good will accrue to such companies as Ajax, Auburn, on its four-cylinder line, Cleveland, Essex, Jewett, and to Moon and Nash on certain open models, since this group will get the benefit of the major reduction in general tariff from 35 per cent to 20 per cent which accrues to cars whose domestic retail price, including the 3 per cent U. S. excise tax, is $1200 or less.

A $150 Difference

A car such as the Ajax sedan, for example, which lists here at $995, had to pay a tariff of about $350 under the old 35 per cent levy, while under the new 20 per cent levy it will pay only about $200—a difference of approximately $150. That means that a car, listed here at $995, now can be shipped into Canada and sold there without lowering profits for about $150 less than would have been possible before the revision went into effect.

A car listing here at $1195, including tax, if built in the United States and shipped into Canada, would have paid $418.25 duty under the old tariff. Under the new schedule it will pay only $238, a net difference of $180.25.

Cars whose U. S. retail price, including tax, is more than $1200, must pay a duty of 27.5 per cent under the new Canadian tariff as opposed to 35 per cent under the old, a reduction of 7.5 per cent. While the tariff reduction is considerably less in the case of these higher priced cars, the number of manufacturers who will benefit from the reduction is much greater than in the lower price groups. Relatively few of the manufacturers of cars selling for over $1200 have had Canadian manufacturing plants. General Motors, of course, with Cadillac and Buick, Willys-Overland with the Willys-Knight line, Reo, Studebaker, many of whose models are in this class, and Chrysler with its six have been building in Canada for some time cars which in the United States list for over $1200. But there are nearly 35 other makers in this country producing cars which retail at more than $1200. All of these 35 will benefit directly from the 7.5 per cent tariff reduction on their products.

Dealers Not Considered

Consequently all of the manufacturers who have not been maintaining plants in Canada are enthusiastic about the opportunities afforded them for increasing their business in that territory. Only one thing is bothering them, as well as those who have been maintaining Canadian factories—

The dealer situation apparently was not considered at all in the making of the tariff revision. The price reductions which naturally have followed the reduction of levies leave the Canadian dealers with cars stocks on which they must take a heavy loss. The 3500 dealers and distributors who make up the Canadian distributing organizations stand to lose something like $5,100,000 on these stocks according to C. J. Brawley, secretary, Toronto Automobile Trade Association.

Dealers naturally are eager for the factories to rebate them on the cars now on their floors so as to cover this loss. Just how extensively the manufacturers will accede to this request is difficult to determine exactly at this time. Ford Motor Co. is said to have some special arrangement in this regard, although details of the Ford action are not available for publication.

What the others will do is problematical. Each factory is wondering to some extent about what the other fellow

is going to do. Some companies say that if they did rebate dealers in this instance it would mean the loss of profits which have accrued from Canadian operations for the last twelve or eighteen months. Reserves for such a contingency have not been set up usually and the manufacturers are inclined to feel that the Canadian Government in writing the new tariff bill should have made some provision for reimbursing dealers for losses which they were sure to sustain through the passage of the measure.

Policies Still Undecided

Many factories, unquestionably, still are undecided as to the policy they will pursue in this matter.

Already much discussion has centered around the effect of the tariff reductions on those U. S. companies which have been running factories in Canada. From their standpoint, undoubtedly, the downward revision of the tariff must be considered as an unfavorable move, for the present at least. Viewed from a long swing standpoint, however, it is not at all certain that they, too, will not benefit from the lower levies.

Alfred P. Sloan, Jr., president, General Motors Corp., in a statement issued shortly after the budget announcement, said:

"So far as General Motors is concerned, its operations in Canada have been largely of an assembly character and it is well equipped to operate on either side of the line to any degree that the economics of the situation require. So, from the standpoint of the corporation as a whole, we are not affected particularly one way or the other."

Ford Motor Co. of Canada, it is announced, will continue uninterrupted operations. The new Ford Canadian prices are said to approximate the cost of Ford cars brought from the American side on which the new duties are paid. Ford is built in the Canadian plant, which entitles this company to the 25 per cent drawback on tariff paid on parts shipped to Canada and used in making up the Canadian cars.

Ford is said to be the only company which does build 50 per cent or more of its Canadian product in its Canadian plant. Thus its chances of conducting Canadian operations profitably under the new tariff would seem to be better than those of most other makers.

Final decision as regards Willys-Overland action in regard to its Canadian operations evidently has not been made yet. In a statement issued a few days, ago, John N. Willys said that the Willys-Overland Canadian plant would be closed only if study of the tariff changes showed that such closing would be to the advantage of Canadian customers.

May Have to Take Loss

If our manufacturers having Canadian plants decide that those plants cannot be operated profitably under the conditions made by the lower tariff—and it seems likely that this will be the decision in a number of cases—a considerable immediate loss would seem to be involved inevitably in idle plant facilities, idle production equipment and so forth. The tariff advantage to be gained on export shipments through Canada to Great Britain and its possessions would scarcely be sufficient to compensate for loss of the Canadian market by Canadian plants, since exports last year comprised only 31.5 per cent of the total Canadian passenger car production.

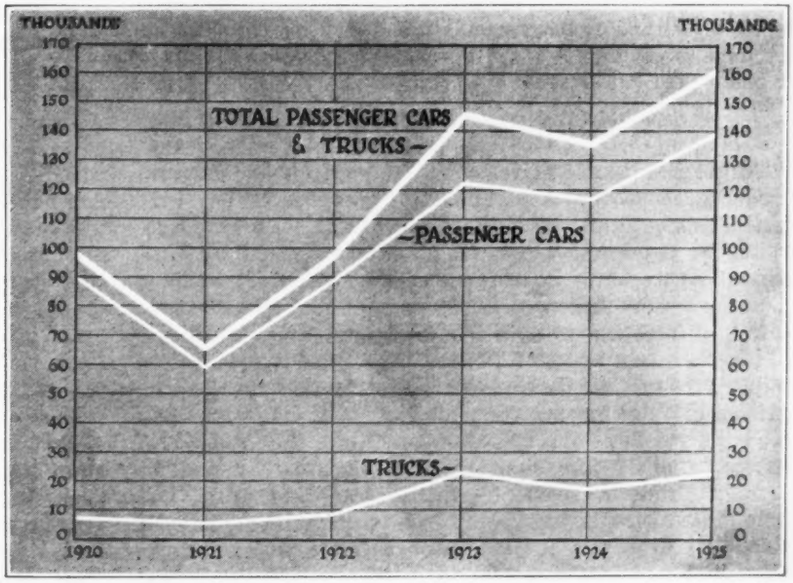
Consequently, another loss to be sustained by these

Canadian Motor Vehicle Registrations, 1926
Persons per Motor Vehicle

Province	Passenger Cars	Trucks	Total	Persons per Vehicle
Nova Scotia	20,047	2,563	22,610	23.2
New Brunswick	17,420	1,357	18,777	20.6
Prince Edward Is.	2,824	115	2,939	30.2
Quebec	80,999	14,329	95,328	24.8
Ontario	303,736	34,690	338,426	8.6
Manitoba	50,385	3,746	54,131	11.3
Saskatchewan	71,205	6,731	77,936	9.7
Alberta	52,350	2,367	54,717	10.7
Brit. Columbia	45,683	9,071	54,754	9.6
Yukon	76	24	110	37.7
Total	644,725	74,993	719,718	12.2

Canadian Car and Truck Production, 1920-1925

YEAR	CARS	TRUCKS	TOTAL
1920	90,000	7,868	97,868
1921	59,841	5,514	65,355
1922	89,084	8,820	97,904
1923	122,543	22,814	145,357
1924	117,765	17,481	135,246
1925	139,311	22,078	161,389



companies will be in their inability to get the advantage previously enjoyed of preferential tariffs on shipments to Great Britain and the British colonies. Desire to take advantage of the preferential rate available on shipments made from Canada was of course, one of the reasons for locating manufacturing plants in Canada originally. If the Canadian plants are shut down and cars shipped to the British colonies from the U. S. factories direct, these particular companies will have to pay 11½ per cent more in tariff on shipments to the United Kingdom and various rates to British colonies higher than they have during the years in which they have been shipping from their Canadian plants.

Last year the number of cars shipped to Great Britain and British colonies from Canada totaled 39,577 and their value was $17,624,020; truck shipments totaled 13,631 and were valued at $4,340,607.

But the tariff advantages gained by shipping cars from Canada are not actually so great as might be thought at first glance, despite preferential rates to Canadian products in British colonies. In the following British areas automotive products from Canada are admitted at lower rates of duty than similar products from the United States:

United Kingdom and Irish Free State.
Australia (chassis only).
New Zealand.
British West Indies.
Cyprus.
Fiji Islands.
Mauritius.
British Guiana.
British Honduras.

The apparent tariff advantages granted Canada in a number of the above mentioned areas is somewhat offset, however, according to the Division of Foreign Tariffs, Bureau of Foreign and Domestic Commerce, by the practice in certain of these areas (namely Australia, New Zealand, Cyprus and the Fiji Islands) of basing ad valorem duties on the current domestic value in the exporting country. "Since the cost and selling price of most automobiles are higher in Canada," the statement of the Tariff Division continues, "than for the similar car manufactured in the United States, there results a higher dutiable value on Canadian cars which largely offsets the lower rate of duty. In other British areas, where the duty is assessable on the actual selling price to the importer, whether the higher Canadian cost of production would curtail the tariff advantage or not depends upon whether the price of the cars for export is based upon actual costs or equalized to the export prices from a U. S. plant."

Preference Requirements

To get the benefit of the preference given to Canadian products, moreover, Australia requires that 75 per cent of the product must be built in Canada; New Zealand requires 50 per cent; while the other areas mentioned require 25 per cent. It is rumored that an effort to have the 25 per cent increased is being made in Great Britain.

It is interesting to note that complete cars, trucks and motorcycles get no preferential rate in Australia when shipped from Canada and that Australia is the leading British colonial market for American vehicles. Canadian products get no preference whatever in the Union of South Africa, another important market. By the Australian-Canada Trade Agreement, which came into effect last October, Australia extends the intermediate column of rates of its tariff to automobile chassis assembled and unassembled and to automobile parts not otherwise specified from Canada.

American-Controlled Car and Truck Factories in Canada

General Motors of Canada, Ltd., at Oshawa, Ont.
McLaughlin Motor Car Co. of Canada, Ltd. at Oshawa, Ont.
Chevrolet Motor Co. of Canada, Ltd. at Oshawa, Ont.
Oakland Motor Car Co. of Canada, Ltd. at Oshawa, Ont.
Olds Motor Works of Canada, Ltd. at Oshawa, Ont.
Ford Motor Co. of Canada, Ltd. at Ford, Ont.
Dodge Bros. of Canada, Ltd. at Toronto, Ont.
Graham Bros. of Canada, Lt. at Toronto, Ont.
Durant Motors of Canda, Ltd. at Leaside, Ont.
Chrysler Corp. of Canada, Ltd. at Windsor, Ont.
Willys-Overland, Ltd. at Toronto, Ont.
Studebaker Corp., Ltd. at Walkersville, Ont.
Reo Motor Car Co. of Canada, Ltd. at Windsor, Ont.
International Harvester Co. of Canada, Ltd. at Hamilton, Ont.
Gotfredson Corp., Ltd. at Walkersville, Ont.

Whatever disadvantage does accrue through loss of tariff preferences will be offset to some extent in the case of several of these makers by the fuller utilization of foreign assembly plants which already have been or soon will be opened in various British colonies. A good share of the business of several companies in the United Kingdom itself already is taken care of by assembly or manufacturing plants in the British Isles. Sooner or later something of the same conditions seems likely to come about in the more important British possessions so far as the quantity production lines are concerned.

Last year 3060 cars and 2006 trucks valued at $3,330,952 went from Canada to Great Britain, taking advantage of the preferential tariff of 22 per cent as opposed to the 33 1/3 per cent which would have been levied had the vehicles been shipped from the United States. On the other hand, 17,570 cars and 4327 trucks, the total value of which was $18,742,935, were shipped directly to Great Britain from the United States. The reimposed McKenna duties went into effect July 1, 1925.

Thus it appears that the number of American producers who stand to benefit by the Canadian tariff reduction is considerably greater than the number who stand to lose by it, even in an immediate sense. The number of factories making cars which sell for over $1200 who will benefit by the decline is particularly large as compared with those who will suffer.

And it is perfectly conceivable that every American manufacturer will benefit from the lower duties in the long run. Suppose, for the sake of argument, that the tariff reduction makes possible a reduction of $150 to $200 in the average retail selling price of automobiles in Canada. That lower price inevitably will open up a wider market for cars and trucks.

The ratio of motor vehicles to population for the whole of Canada today is the same as in those states of our country in which motor vehicle population is lowest in proportion to population. Alabama and Georgia stand at the bottom of our states in persons per motor vehicle with one vehicle for every 12.7 and 12.5 persons respectively. Canada has a motor vehicle for every 12.2 persons.

Ontario is at the top of the Canadian list with one vehicle for 8.6 persons; at the other end of the Canadian scale is Yukon with one for every 37.7 persons. With great agricultural wealth and rapidly growing fundamental prosperity, there is every reason to believe that Canada would continue to increase as a market of importance even with automobile prices at their 1925 levels. With a general lowering of price levels by $150 or $200 it is reasonable to suppose that the size of the market will be widened materially.

There is no way of determining quantitatively in advance just how much increase logically may be expected from the price declines resulting from the lower tariff, but it is perfectly conceivable that the increase could be large enough to compensate for their troubles even those U. S. manufacturers who will have incurred losses through the closing of their Canadian factories. Commenting on the relation of price to increased market in Canada, an editorial in *Motor in Canada*, replies to a dealer's statement that one or two hundred dollar price reduction might not help sales much with this statement:

"Certainly prices will never be the prime consideration with the wealthy, but, with the rank and file of the human race, every hundred dollars or more off the price of a car brings it nearer to ownership."

95,000 Cars Sold in 1925

Approximately 95,000 passenger cars were sold in Canada last year. Of this total, a little over 81,000 were built in Canada and about 14,000 were imported from the United States. Imports from other countries were negligible so far as the total is concerned. In 1924, the Canadians bought about 70,000 cars; in 1923 about 98,000 and in 1922 about 90,000.

If we should assume that at least a 15 per cent increase in sales might reasonably be expected in Canada this year, regardless of tariff action, the 1926 estimated Canadian consumption would be around 110,000.

If the lower tariff in effect for eight months of the year should succeed in increasing the 1926 market only 5 per cent more than the 15 per cent total, sales in Canada this year would mount to well over 115,000 cars, while similar proportionate increases might reasonably be expected in the truck market. In terms of units, as we are accustomed to think in this country, 115,000 cars is not a huge number, but in terms of dollar value it represents a large market, particularly when considered as merely the starting point for future development of an important area from an automotive merchandising standpoint.

Except as it relates to those companies which have been operating Canadian plants, the effects of the tariff reduction from a purely Canadian angle are only of indirect interest to manufacturers. The genesis of the reduction in Canadian politics and economics, however, and understanding of arguments pro and con which preceded recommendation of the new tariff measures in the budget have a very direct bearing on the possibilities of permanency of the present schedules.

Generally speaking, the credit—or blame—for the reductions seems to rest with the agricultural interests of the Dominion.

Everybody was agreed that a lower tariff would mean lower priced automotive transportation for the Canadian public. Lower car prices will be distinctly agreeable to the farmer and dismantling of Canadian automobile manufacturing plants means little or nothing to him one way or the other.

Nearly everyone financially dependent upon the Canadian automobile manufacturing industry in Canada was heartily opposed to a tariff reduction, because they felt that such a reduction would make it impossible to operate the Canadian plants profitably. Canadian motor magazines, practically as a unit, opposed the reduction, because, they pointed out, between 10,000 and 20,000

Canadian Passenger Car Production and Exports

	1922	1923	1924	1925
Canadian Production	89,084	122,543	117,765	139,311
Canadian Exports ..	9,755	35,394	57,481	43,883
Ratio Exports to Production	10.9%	28.9%	48.7%	31.5%

Canadian workmen probably would be thrown out of work almost immediately, while a considerable amount of money which otherwise would be going into Canadian pockets, would go to workmen and factory supply makers across the border in the United States.

So far as can be observed from this distance, the division of opinion economically within Canada itself was pretty much based on the personal interests of the various parties concerned, as is only natural.

Politically, according to our Toronto correspondent, the reductions were made possible by the influence of a group of free trade progressives with the Liberal Government. The McKenzie King Government is committed to a policy of "tariff for revenue only" and depends for its political life on the support of a group of free trade progressives —essentially a farmer group—since the conservatives actually have more seats in the House of Commons today than the Liberals. The budget provisions calling for automotive tariff reductions, our correspondent says in effect, were accepted by the Government because of pressure brought to bear by the progressive group upon which it relies for its political life.

The progressives, however, do not all agree on the subject, since some of the group come from industrial portions of Ontario. Nevertheless the vast majority of this group are from agricultural provinces and strongly favored tariff reduction on automobiles.

As we go to press, the new tariff rates are actually in effect although they have not yet been approved by the House of Commons. Theoretically the possibility exists of the new rates being voted down. There are three laborites in the House of Commons. If these vote with the conservative members and five liberal protectionists —or a combination of five liberals and progressives or independents vote with the conservatives—the McKenzie King Government will go down to defeat, according to our correspondent.

Most Canadian manufacturers, however, feel confident that the budget will pass the House of Commons substantially as drafted. A budget has never been voted down in the history of Canada, it is pointed out, and although detailed corrections sometimes have been made, changes never have been made in essentials.

Since the lower motor vehicle prices which will accrue from the tariff reductions are popular with the farmers and with the average man in industrial centers, unless he is directly to be harmed by the closing down of automotive plants, it seems likely that the new rates will be in effect for some time to come. It cannot be denied, however, that a bare possibility of further change exists.

Chromium-Plated Radiator Shells Introduced on Oldsmobile

Process developed by General Motors Corp. also being applied to bumper bars, starting-crank hole covers, lamp lock rings, radiator caps, etc. Production cost less than nickel-plating.

By Walter L. Carver

UNUSUAL durability and permanency of luster are achieved by a chromium plating process which is now being used at the plant of the Olds Motor Works at Lansing, Mich. Radiator shells have been finished by the new process for some time and its use is being widened to include bumper bars, starting-crank hole covers, radiator caps and filler necks, lamp lock rings, etc.

Ultimately it is planned to apply chromium plating to practically all exposed parts of decorative nature. Exceptions to this policy will be door handles and similar parts which derive their luster from white metal compositions.

Like Duco finish, which also was introduced to the trade through the medium of the General Motors Corp., the new decorative finish requires no polishing but is returned to its original luster throughout the life of the car by mere washing.

LAST week we published excerpts from a recent paper on chromium plating, by E. T. Ollard, of the Metropolitan-Vickers Electrical Co., of England, in which Mr. Ollard predicted that "in a few years' time a large percentage of automobiles will be conspicuous by their chromium-plated lamps and fittings."

Evidently the development of chromium-plating processes has progressed further in America than in England, for the General Motors Corp. now announces that it has been applying a chromium finish to Oldsmobile radiator shells and other exposed decorative parts for several months.

In another particular the Americans appear to have progressed further than the British; that is, in finding a process that is not costlier than nickel-plating. Mr. Ollard thought that chromium coating might be applied at not more than double the cost of nickel, but General Motors Corp. states that its process actually is less expensive to produce than nickel-plating.

Details of the General Motors process are described in the accompanying article.

The bright luster is obtained without the necessity of a buffing operation after the plate has been applied by an electrolytic process at the plant. When the radiator shell or other part has been withdrawn from the plating bath, only a rinsing operation in cold water is applied to remove the plating solution. The part has a bright smooth luster which is retained indefinitely.

Tests have shown that the chromium plate is at least five times as hard as nickel plate. Where a sapphire point, which is used in the micrographic test for hardness, plows a furrow in nickle plate or even in a steel bar, its effect on a chromium plated surface is practically invisible.

The hardness, density and insolubility of the chromium plate is demonstrated further by the results of accelerated salt spray tests. In this test the plated part is hung in a closed cabinet and subjected to high pressure spray of a solution consisting of water containing 20 per cent of common salt by weight. Where high grade nickel plate will resist this action for 20 hr. before the appearance of corrosion or rust spots, chromium plated parts will withstand the severe corrosive action for 80 hr. before the first signs of breakdown appear. When the results of previous salt spray tests are checked by experience in actual use, the ability to withstand 80 hr. exposure is indicative of at least ten years' life in actual service.

Polishing Unnecessary

From the owner's viewpoint, the elimination of any necessity for polishing to retain bright luster probably is the outstanding feature of the new finish. As applied over a coat of nickel plate, the chromium plated parts have a bluish white luster which apparently is more desirable than the yellowish luster of nickel plate. Finally, the new plate is insurance against rust and corrosion from any source which may be encountered in service.

W. M. Phillips of the General Motors advisory staff succeeded in bringing this chromium plating process within the range of commercial possibility. Although the process is electrolytic, much of previously accepted practice had to be discarded before tangible commercial results were obtained. Chromium plating solutions are of a much greater concentration than those used for any other form of electro-plating and the density or amperage of the electric current is many times that which is common for copper and nickel plating in present day automotive work—120 amp.

Fig. 1. Polishing radiator shells on glued cloth and emery wheels to obtain smooth metal surface before copper plating operation

In the early stages of the plating process no appreciable variation is made from the usual nickel plating routine. Shells are delivered first to a line of double-end American grinder stands which are equipped with glued cloth emery wheels for a preliminary polishing operation as shown in Fig. 1.

Next the polished shells are delivered to a battery of tanks as shown in Fig. 2. At the right are located several cleaning and rinsing tanks while the continuous process copper and nickel-plating tanks are shown at the left. A single copper-plating tank is in the background with two nickel-plating tanks in front. In the second operation, the polished shell is suspended by copper hooks from a bus bar in a hot alkaline cleaning bath. Immersion is for a few seconds and the bath contains a small amount of copper cyanide salts which impart a copper color to the cleaned part. The alkaline bath is made according to General Motors specification but the chemical contents are similar to those of many of the commercial cleaning compounds.

20 min. for Copper Coat

For the third operation, radiator shells are suspended by copper hooks in the continuous copper-plating tank. The shells make one round trip through this tank suspended from a chain conveyor which incorporates electrodes that ride on a copper bus bar. The time for the copper plating operation is 20 min. Copper cyanide salts form the base of this bath which has a high degree of concentration. In order to obtain a dense copper plate, the current is of higher amperage than is customary for this work.

Following this operation a variation from the usual nickel-plating procedure is made. As usual the shell is given a hot water rinse but the buffing operation is eliminated and the part is hung in one of the nickel-plating tanks. The conveyor facilities in these tanks are similar to those in the copper-plating tank but the speed is reduced so that 40 min. are required for complete passage through the bath. Nickel anodes are used and the bath is a chloride solution of relatively high concentration. As for the copper plating, the current density is high.

After another hot water rinse, the nickel-plated shells

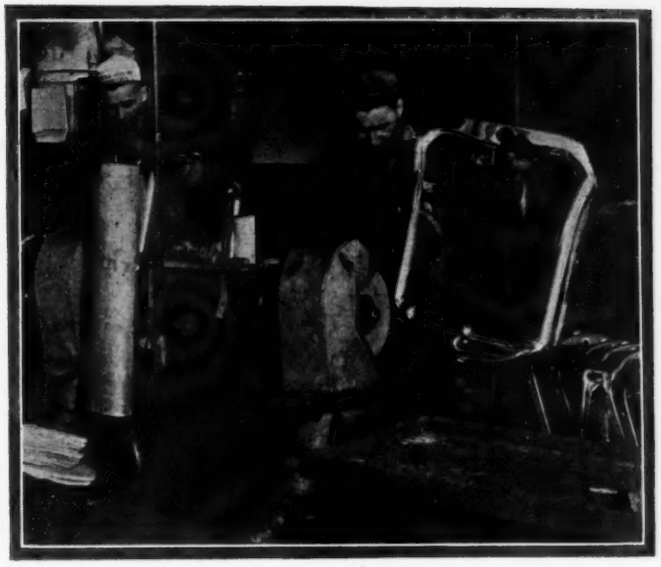


Fig. 3. The only buffing operation follows nickel plating and precedes chrome plating. Cloth wheels are used

are delivered to the buffing line which is shown in Fig. 3, where cloth wheels are used to bring the nickeled surface to a dead smooth, bright finish. While the chromium plate can be placed directly on the copper, the nickel plate is interposed to act much like the ground color in the paint shop. In spite of its hardness and

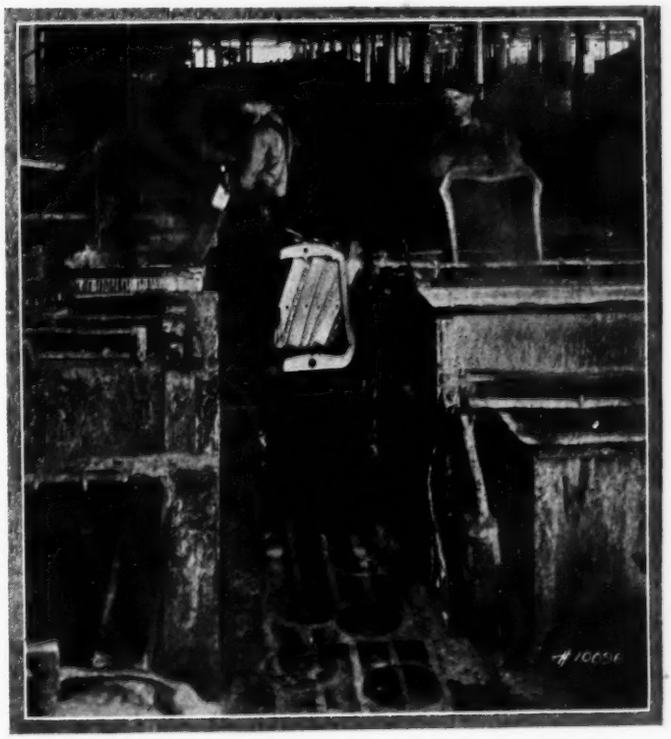


Fig. 2. Battery of tanks for copper and nickel plating as well as for the intermediate cleaning operations. Electrolytic cleaning tanks and hot water tanks at right

permanence, the chromium coat is thin and tends to take the tint of the coat directly beneath. As no buffing is attempted on the final chromium coat, the smoothness of the nickel coat is highly important.

From the buffing line, shells are passed to another battery of tanks as shown in Fig. 4. An electrolytic

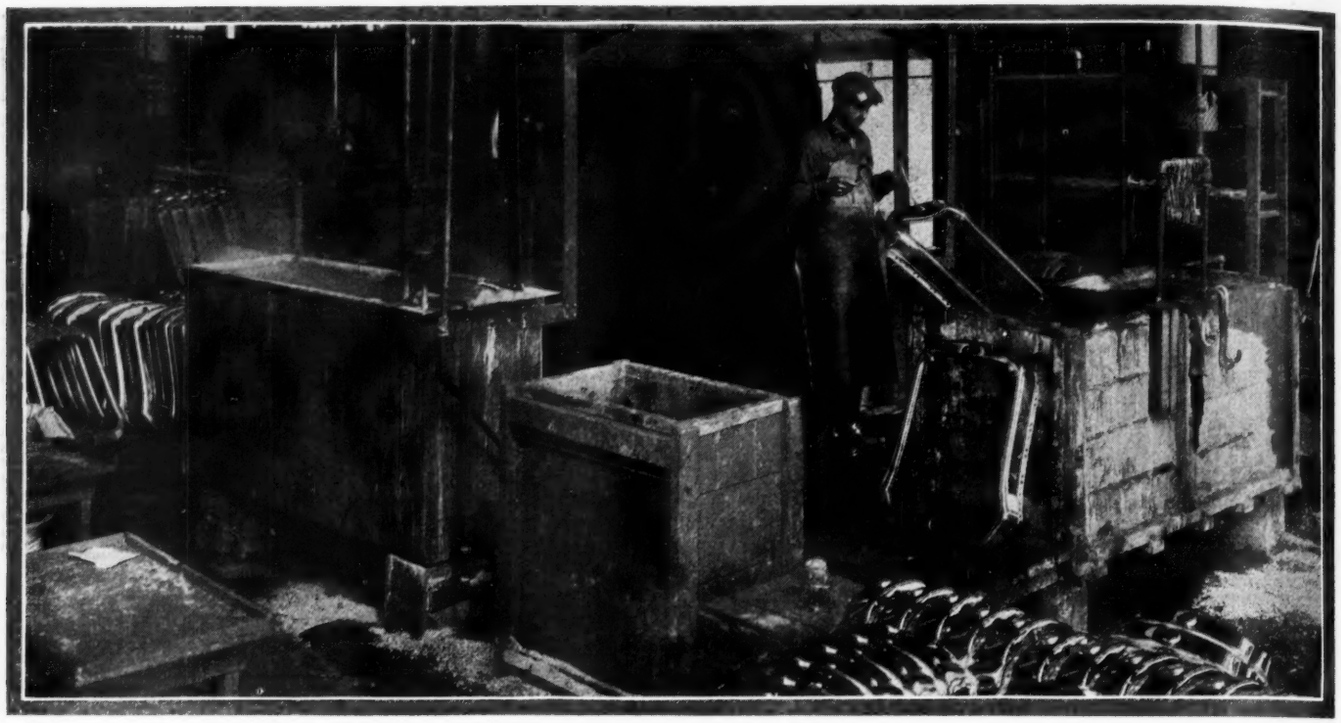


Fig. 4. Chromium plating battery comprises electrolytic cleaning, cold water rinsing and chromic acid tanks. Unbuffed finished shells shown in foreground

cleaning tank is shown at the left with the hooded chromium plating tank in the rear and the cold water rinsing tank at the right. One man handles the entire battery. In the group of operations at this point, electrolytic cleaning is first and is similar in every respect to the previous operation of the same designation. Then follows a cold water rinse in the tank at the right.

At this point, copper hooks are used again and the shell is immersed in the chromium plating tank for 2 min. Upon withdrawal the shell is rinsed in the cold water tank as shown and is completely ready for assembly with the core assembly.

Chromic acid, $Cr\ O_3$, of 97-98 per cent chemical purity is the foundation of this bath, although slight amounts of other chemicals are required for the success of the process. As related to the cost of the metal by this process, chromium costs 50 cents per lb. while the cost of the nickel is 46 cents per lb. As chromic acid of this degree of purity has not been used extensively in industry, its production has been limited. However, a number of sources of supply are available and with increasing industrial usage, it is stated that the price will be cut materially.

In the preliminary experimental work, the degree of purity of the chromic acid was one of the stumbling blocks as materials of ordinary commercial purity were altogether unsatisfactory. In a similar manner, the amperage of the electric current is altogether outside of the range of other plating practice. Another point of variation from existing plating practice is the anode which is insoluble in the bath.

The total thickness of the plate is .0006 in. While this figure seems almost infinitesimal yet its maintenance is a highly important detail. After the routine outlined in the previous paragraphs has been followed, the hardness when measured under a micro-character needle is at least five times that of nickel plate. Even under the microscope, the scratch made by the sapphire pointed needle is most minute.

At first glance it would seem that the new process is more expensive than straight nickel-plating. But when the small thickness of the chrome film is considered and balanced against the elimination of the buffing operation between copper and nickel-plating and the absence of the final buffing operation, the total cost at the present time is less than that of the older process. This cost is based on a production of slightly more than 300 radiator shells per day. With the broader application of the process to all other decorative parts having a steel base, a further reduction is anticipated. This reduction will be brought about by the decline in the price of chromic acid following its production in larger, more commercial quantities.

Industry Using More Copper

IT is estimated that the total consumption of copper by the automobile industry in 1925 totaled over 245,000,000 pounds—a record figure—according to the Copper & Brass Research Association.

The principal items into which copper, brass and bronze enter as construction materials for automobiles are lighting, starting and ignition systems; radiators and water tanks; gas and oil piping; bushings and bearings; instrument and machine parts; hardware, trim and fittings.

The growing preference for closed car models has increased the copper requirements for lighting systems, and for brass body hardware and trim. The growing use of mechanical refinements, such as air filters, oil cleaners, central chassis lubrication and four-wheel brakes, likewise call for increased use of copper and its alloys.

Acknowledgment

IN the article on the Dewandre vacuum servo brake which appeared in our issue of March 25 last, use was made of a cutaway view of the brake which was originally prepared by the art department of *The Autocar*. Acknowledgment is hereby made to that publication.

Replacement Market Alone May Soon Absorb 2,900,000 Cars *a Year*

Analysis of present trends indicates that the demand for motor vehicles to replace those dropping out of service will approach 3,000,000 in 1930.

By K. W. Stillman

DURING 1926 there will probably be in the neighborhood of 1,848,000 motor vehicles eliminated from service through obsolescence, accidents and other causes.

If, as may be assumed to be true in general, all of these scrapped vehicles are replaced by new ones, and if 1926 production should be about the same as 1925, the replacement market thus created will require very nearly half of the year's production for domestic use, leaving only some 1,952,000 vehicles to be disposed of to first buyers or as additions to present supplies.

During 1927 the size of the market created by elimination of cars and trucks now in use bids fair to increase to something like 2,117,000 vehicles and in that year may easily absorb more than half the total production exclusive of exports, unless total production greatly surpasses all previous records.

AUTOMOBILE production and sales reached new high levels last year. Extremely optimistic expectations are entertained for an equal, or even better, volume of business this year. But what of next year and the years to follow?

We present here a study of the future possibilities of the industry from the standpoint of market growth. It is largely speculative in character but the speculations are based on known trends and familiar statistics; past and present developments are simply extended into the future and the mathematical results set down.

All automotive men are interested in the future of their business. What, for instance, are sales likely to be in 1930? This article gives a guess which is well worth reading.

For 1928 and for several years thereafter the number of cars and trucks which will be eliminated from active service each year should continue to increase, thus constantly decreasing the relative number of vehicles that must be sold to new buyers in order to keep production at its present level. Approximate eliminations for 1928 may be estimated at 2,400,000; for 1929 at 2,700,000, and for 1930 at 2,900,000.

The motor vehicle "saturation point," so-called, or what may possibly be better termed the "point of stability," may be defined for the automotive industry in the same way as it has been used for older industries, namely, as the point where the rate of increase of business becomes constant and approximately equal to the rate of increase of wealth and population of the country. Various prophets have hailed the arrival of this period in the past and have placed the maximum possible motor vehicle registrations for the country at anywhere from 15,000,000 up, but the registration total is still growing.

It now appears likely, however, that our export markets will continue to grow for a number of years, due not alone to the widening use of motor vehicles in foreign lands but to the future overseas replacement market as well. Also replacement of scrapped vehicles will probably take an increasing amount of our domestic production for some years to come. As a result of these two factors the progress of the industry toward that forbidding point of stability will be growing slower and slower and it is likely not to be reached within the next five years at least.

For speculative purposes let us suppose that the point of stabilization will be reached when there is one motor vehicle for every 4.5 persons in the country or, in other words, that when there is about one motor vehicle per family practically all further sales to new buyers must, in general, come from increments of population increase.

That this is the limit of sales possibilities is not at all certain. At present most of the "new buyer" sales efforts are concentrated upon families who do not already own cars and there are still enough such families in the country to make these efforts profitable. When distribution of motor vehicles becomes so widespread that prospects of this kind become scarce there appears to be no good reason why sales efforts could not be turned successfully upon selling a second car to families already owning one. Even today many families consider two cars a necessity so that one may be used to carry the man to his office and the other used by the wife for shopping and social activities. When manufacturers concentrate their efforts upon this class of prospects they will undoubtedly be able to create a new market of considerable proportions.

Another factor which makes the ratio of 4.5 persons per motor vehicle slightly misleading is the inclusion of truck and bus registrations in determining the ratio. Population may safely be used as a criterion of the number of passenger cars which may be operated in the country but it has no such definite relation to truck and bus sales. We may confidently expect that one passenger car per family is not impossible to attain but in addition to this there is and will be an additional need for trucks and buses.

In view of these factors it appears reasonable to as-

sume that in taking the ratio of 4.5 to 1 as the point of stabilization we err on the side of pessimism instead of being too optimistic of the future.

The rate of growth of this country's population since 1920 has been about 1,750,000 per year. Making allowance for the probable decreased rate under the present immigration laws, an estimate of the population for 1930 is 120,000,000. At the rate of 4.5 persons per motor vehicle, there will be required in that year about 26,800,000 registered cars and trucks in order to bring about stabilization as referred to before.

During the years 1926, 1927, 1928 and 1929 something over 9,000,000 vehicles will probably be needed to replace those which will be scrapped, or an average of about 2,250,000 per year. 1925 registrations were about 19,850,000, so that about 6,950,000 new vehicles would need to be added to the motor vehicle population of the country during the next four years in order to bring about "saturation," or about 1,737,000 vehicles per year.

Total yearly requirements of motor vehicle production in order to bring the total number in operation up to the 4.5 ratio by 1930 would then be the sum of 2,250,000 replacements and 1,737,000 new sales, or a total of nearly 4,000,000 cars and trucks per year.

This figure, it must be remembered, refers to production for domestic sales only, so that even if our future export market shows no increase over that of 1925, which would appear to be a very pessimistic assumption, a total average production of over 4,500,000 vehicles would be required during the next four years in order to bring the total motor vehicle population up to the ratio, which, for the purposes of this discussion, has been assumed to be the point of stabilization.

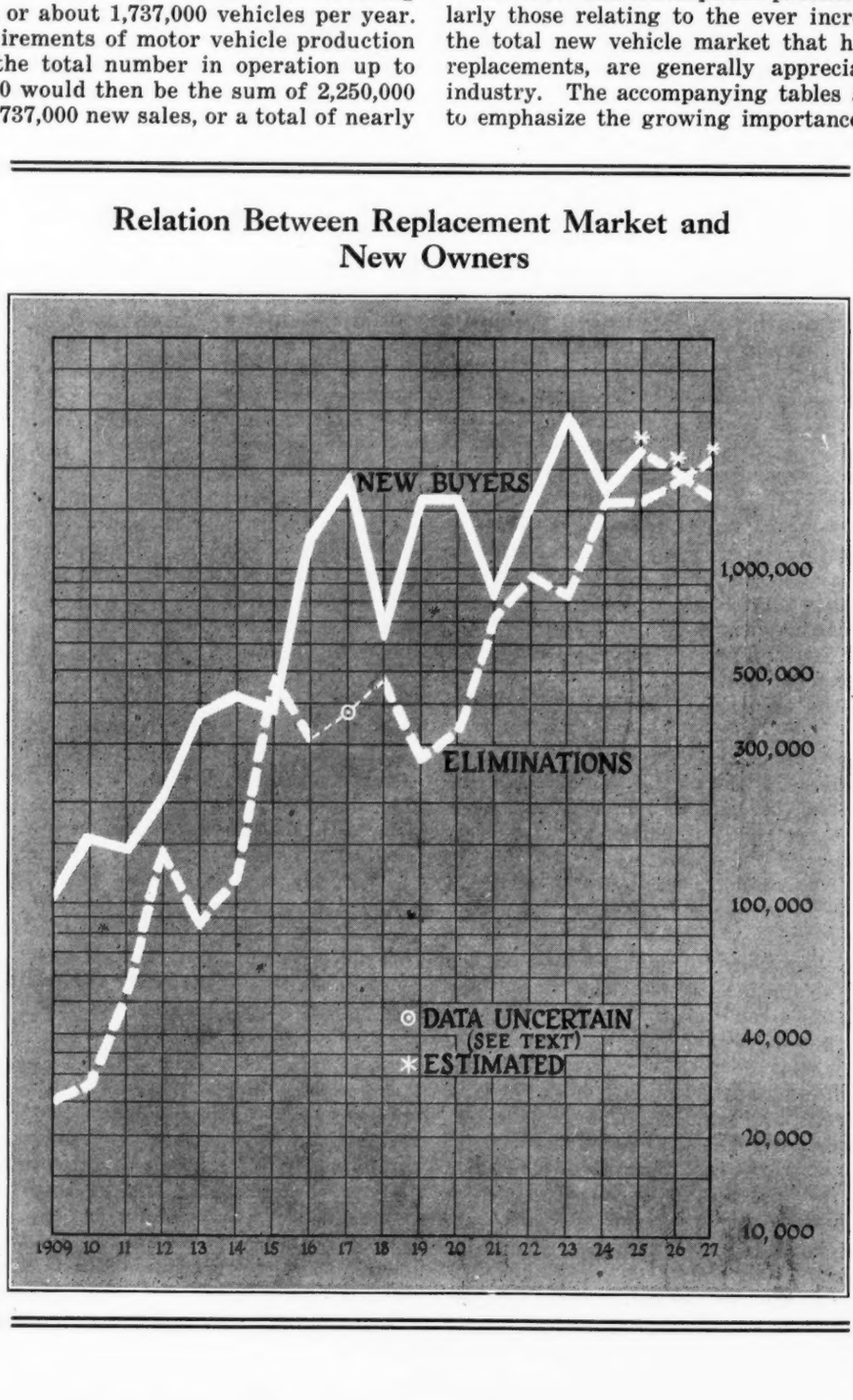
If new car sales for the next four years remain in general the same as those of 1925 —about 3,800,000 —total vehicles in operation in 1930 will still lack several million of the number required for our assumed stabilization.

The replacement market is growing so rapidly and has already assumed such an important place in the total market that even a pronounced slump in general business or in the automotive industry alone, if such a thing should occur, could scarcely lower production to the 1924 level and most certainly the level of 1921 could never again be reached.

This is true because it is inconceivable that production could ever be lower than the replacement market and as stated before, the probable replacements alone for this year—1926—will be about 1,848,000 vehicles or some 300,000 more than the total production in 1921. And replacements will continue to grow in the future. In fact, with the yearly replacement market for the next five years averaging well over 2,000,000 vehicles, and as much if not more in later years, it does not seem as if total production, under any conceivable conditions, could possibly fall below 3,000,000 cars and trucks in the future.

The facts and assumptions presented here, and particularly those relating to the ever increasing proportion of the total new vehicle market that has been made up of replacements, are generally appreciated throughout the industry. The accompanying tables and chart may serve to emphasize the growing importance of this part of the automotive market.

Relation Between Replacement Market and New Owners



The chart indicates that the rate of growth of sales to new buyers was fairly constant and quite rapid from 1909 to 1917. From 1917 up to the present time there has been growth, but at a much less rapid rate than in previous years. This change is represented graphically by plotting the chart on so-called ratio paper so that the slope of the line connecting any two points directly reflects the rate of change of the quantities represented by the points.

Eliminations of cars and trucks from service increased from 1909 to 1915 with the single exception of 1913. From 1915 until 1920 eliminations were very erratic and in one year—1917 —there is an indicated negative number of eliminations, signifying that more old cars which had not

been registered during 1916 were put into service during 1917 than there were cars scrapped during 1917. Such a condition appears unreasonable, but the years from 1915 to 1920 include the war years and the period of post-war adjustment when business in general was quite out of step with its usual ordered progress, and while the effect this might have had upon the length of time a motor vehicle was run before being scrapped is uncertain, it undoubtedly was instrumental in halting the increase of eliminations.

Errors in Early Data

Some part of this indicated let up of eliminations probably was due to errors in data. The figures upon which this anlaysis has been based are, of course, motor vehicle registrations and domestic production, less exports, plus imports. Available production data may be considered quite accurate, particularly for years since 1913. Registration figures for past years, on the contrary, are very likely to have been considerably different from the actual number of vehicles in operation. That this is true is shown by the numerous corrections it has been possible to make in registration data of recent years through more complete knowledge of just what information was contained in the figures given out by the various States. The many and important corrections which were made to the registrations figures as received by the States before publication in the 1926 Statistical Issue of *Automotive Industries*, and which were quite impossible to make even a few years ago, indicate that past figures may easily have been much different from actual conditions.

Whatever may be the reasons, the fact seems to be fairly well established that during the five-year period from 1915 to 1920 the replacement market did not increase but, in all probability, showed a slight decrease.

After 1920 the trend of the replacement market has been upward and has been climbing at about the same rate as production did during the period from 1909 to 1917. The curve depicting sales to new buyers has been rapidly drawing near to that depicting replacement sales and, as shown on the chart, will probably fall below the latter during 1927.

Griffin's Methods Used

Determination of the replacement market for 1925 and following years has been made according to methods devised by Prof. Griffin of the University of Michigan. The actual number of cars scrapped during 1925 will be unknown until complete data for 1926 production and registrations are available. From checks made on data of other years, Prof. Griffin's method of estimating has proven to be fairly accurate so that, although the data presented here may be quantatively inaccurate, its usefulness in determining future trends has been quite well substantiated. Data for 1925 may be assumed to be very close to what actually happened during that year and in the absence of very unusual conditions estimates of future activities may also be considered as accurate as such forecasts can be.

Certain factors tend to modify the replacement market but can not be taken into consideration mathematically in estimating it. Such a factor is the increased popularity of closed cars during recent years. Without doubt a considerable portion of the increasing number of eliminations during the past few years is directly attributable to the desire of a large number of persons to own closed models. This condition, by decreasing the market for open models, both new and used, has hastened the withdrawal of such cars from service.

Table I

Yearly Distribution of Domestic Sales Between Replacements and New Car Buyers

Cars and Trucks

Year	Domestic Sales	Replacement Market	New Car Market
1908	64,000	14,926	49,074
1909	129,426	25,047	104,379
1910	181,547	28,796	152,751
1911	199,796	53,233	146,563
1912	357,733	146,784	210,949
1913	460,846	87,536	373,310
1914	540,813	121,123	419,690
1915	855,450	474,756	380,694
1916	1,542,086	318,962	1,223,124
1917	1,789,306	73,841*	1,863,147
1918	1,089,436	474,230	615,206
1919	1,893,059	275,075	1,617,984
1920	1,941,570	329,017	1,612,553
1921	1,561,791	709,970	857,821
1922	2,485,108	940,329	1,544,779
1923	3,792,653	827,295	2,965,358
1924	3,327,099	1,599,147	1,727,952
1925	3,851,102	1,600,000**	2,251,102**
1926	3,800,000**	1,848,000**	1,952,000**
1927	3,800,000**	2,117,000**	1,683,000**

* There is an indicated negative replacement market for 1917—see text.

** Estimated.

In Table II is given the numbers of cars of each year's manufacture which may be expected to be eliminated from service during 1926 and 1927 and the number scrapped during 1925.

In determining the total domestic sales for use in the accompanying tables and chart there are several points which may be of interest in explaining possible variations between the data used here and that obtained from other sources.

The fundamental production data employed were N.A.C.C. official figures. For 1920 and succeeding years

Table II

Probable Elimination of Motor Vehicles During 1926 and 1927 by Years of Manufacture

Year of Manufacture	1925 Eliminations	1926 Eliminations	1927 Eliminations
1927	0	0	8,000
1926	0	8,000	80,000
1925	8,000	81,000	169,000
1924	70,000	146,000	226,000
1923	167,000	258,000	338,000
1922	169,000	221,000	268,000
1921	139,000	167,000	183,000
1920	208,000	227,000	233,000
1919	221,000	227,000	216,000
1918	131,000	124,000	109,000
1917	204,000	179,000	143,000
1916	154,000	123,000	91,000
1915	68,000	50,000	33,000
1914	32,000	21,000	12,000
1913	18,000	11,000	6,000
1912	8,000	4,000	2,000
1911	2,000	1,000	
1910	1,000		
Total	1,600,000	1,848,000	2,117,000

the published N.A.C.C. figures include Canadian production of motor vehicles of United States design, so that for these years Canadian production has been subtracted from the published totals.

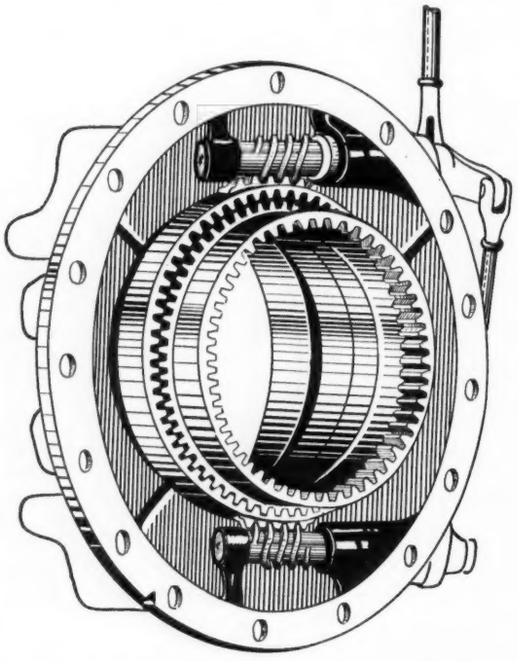
To obtain production for domestic sales it was necessary to eliminate exports. In doing this there is a possibility of error in the matter of handling parts shipped abroad for foreign branch assembly. In some export figures this item is included since in many instances the parts are shipped as complete cars except that they are disassembled. In the 1925 total export figures published in the 1926 Statistical Issue of *Automotive Industries*, for example, there is an item of 180,350 motor vehicles which represents such branch assemblies. The published N.A.C.C. production figures, however, do not include these parts, so, since they are not included in the original production data, they certainly should not be taken out as part of the export total.

In adding imports to domestic production intended for domestic sales there is a small item which, though of relatively little importance, must be considered if the resulting figures are to be accurate. Usual import figures include only those motor vehicles which are dutiable. In addition to dutiable vehicles there are usually about as many again imported free, having been returned to this country whence they originated. Export figures include all exportations whether or not they are intended to be returned, so that, unless the free imports are considered as well as the dutiable items, net exports will appear larger than they actually are.

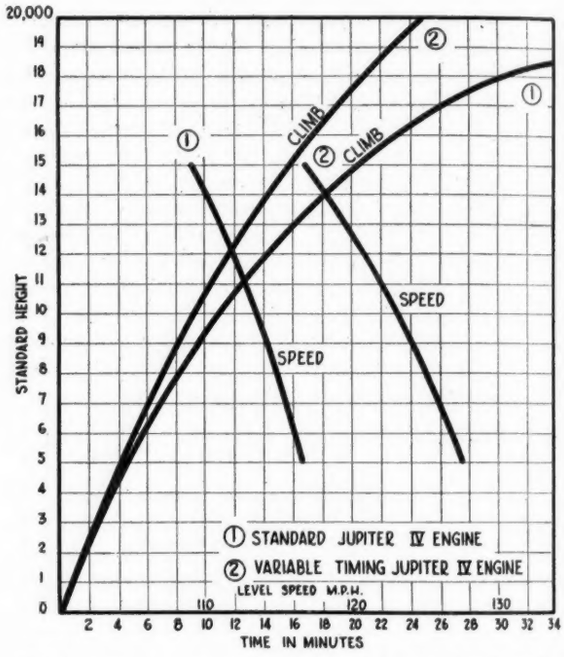
Variable Engine Timing

TOWARD the end of the War the suggestion was made by Harry Ricardo that aircraft engines for altitude flying should be provided with a gear, making it possible to vary the valve timing as the altitude increased. The object was to make it possible to use a high volumetric compression ratio and thus gain the advantages in respect to power and economy which result from the use of high compression. Near the ground the inlet valve was to be closed so late that compression would start only when the piston was well up on the compression stroke. A part of the charge drawn in would then, evidently, be forced out again, but as in a multiple cylinder engine another cylinder will be in the latter part of its inlet period, this part of the charge will not be wasted but enter that other cylinder.

During the past nine months the Bristol Company has been working on the method as applied to its "Jupiter" engine. That engine permitted a practical solution of the problem by reason of the fact that with its double epicyclic timing gear it is a simple matter to arrange for the time of opening of the valves to be changed while the engine is running, and also because the stroke-bore ratio being 1.3 to 1, it was found possible to redesign the cylinder with a compression ratio of 6.3 to 1 without the production of an inefficient combustion chamber. The results obtained with the method as applied to the "Jupiter" engine have been excellent, both on the bench and in the air. A double worm is applied to control the stationary annulus of the timing gear. No moving parts of the engine are affected, and the added weight is only 4 lbs.



Variable timing gear of Bristol Jupiter aircraft engine



Performance curves of plane with standard engine and with engine with variable timing gear

On the test bench it was found that the gear could be operated satisfactorily throughout the whole range with very slight effort, and that the ground level power could be maintained at normal consumption. The engine was then fitted into a Bristol "Bloodhound" machine with which very careful performance tests had previously been made when fitted with a standard "Jupiter" engine of 5 to 1 compression ratio. The machine in both conditions had the same weight and the same propeller and was flown by the same pilot. The result of the two series of tests are represented in the accompanying diagram. It will be seen that on a climb to 18,000 ft. the time is reduced by eleven minutes with the variable timing engine, and that at 15,000 ft. the speed is increased by 8 miles an hour. The gear, it is claimed, does not increase the head resistance of the engine, nor detract from its trustworthiness. These particulars are from *The Engineer*.

Just Among Ourselves

Racing Fans Tuning in on Indianapolis

RACING enthusiasts are beginning to tune in on the news and rumors from Indianapolis. The big race will be held this year on Monday, May 31, as Decoration Day falls on Sunday. In a number of respects the 1926 contest will be the most interesting ever staged over the historic course. This will be the first time that piston displacement has been limited to 91½ cubic inches. Lined up for the start will be Miller Specials, Duesenbergs, Hamlin Specials, and possibly several other creations of American design; several Schmidt Specials, built under the supervision of Albert Guyot in France, and two Eldridge Specials may be sent over to represent England. Three unnamed cars have been entered, one by Harlan Fengler and two by Ralph DePalma. Indianapolis is buzzing with a rumor that DePalma's cars might be put on the track under the name of a prominent car producing company not heretofore identified with racing.

* * *

Engine Speeds Will be Terrific

THERE is considerable speculation as to the speeds the little cars will attain. Last year DePaolo finished first in a Duesenberg with an average speed of 101.13 m.p.h. Can the little 91½ in. "bugs" beat this? Some racing experts say they wouldn't be greatly surprised. Engine speeds at least will be terrific. Six thousand r.p.m. won't be unusual. Fred Duesenberg says he expects to get 6500 and 7000. He also says his new jobs might develop 200 hp. The Millers are said to be tuned up for 7000 r.p.m. These eight-cylinder engines will have cylinders not much larger in diameter than a silver dollar. To speak of the little engines in terms of 6000 or 7000 r.p.m. makes one dizzy. At 6000 r.p.m. the average piston speed will be 3500 feet per minute. Each piston will make 100 double strokes per second. Considering that the pistons must come to a standstill for the fleeting fraction of a second at each end of the stroke, the top speed, reached at the middle of the stroke, will be about 7000 feet per minute. In other words, they'll be traveling at the rate of about 1¼ miles per minute at peak speed. And this speed will be attained from zero in 1/400 of a second, as that is the time elapsing between the standstill and peak speed periods.

* * *

RECEPTION ROOM MONARCHS

No. 2, The "Man Killer"

GEE, this reception room job is terrible sometimes. These salesmen are a fresh lot; great on the talk but pretty poor when it comes to spending any real money on a Jane. And say, most of 'em look like baby hippos or decrepit lions compared to my regular boy friend. I kid 'em along, though; got to do something to make the time pass here. No matter how pleasant you try to be to some of these eggs, though, they keep a serious face; you'd think they never thought of nothin' but business. If a decent looking sheik does roll in, I no sooner begin to make a little progress with him than some big butter and egg man steps up with "Have you called Mr. Smith yet to say that I want to see him?" Well, what if I haven't, there's plenty of time. Gosh, gotta have some fun out of this job; can't be writing down names and answering questions and telephonin' *all* the time. They ought to be glad to sit around and look at me; I ain't egotistical, but I have got a mirror. I don't give nobody no sore eyes. Why some days, I hardly get a letter written myself and as for talkin' over the phone to my boy friend, why hours and hours pass when it just can't be done. When any of our own big guns come through the reception room, I snap into it, but the rest of the time I guess I earn my 20 per without trying to make this bunch of salesmen think they're being received into a new country club. Whadyu expect for a dime, huh?

Plenty of Variety in Car Design

IN variety of design, the cars begining the 500-mile jaunt this year will give the industry plenty to talk about. The Millers and Duesenbergs, for instance, are eight-cylinder jobs. The Hamlin Specials are four-cylinder cars. The Eldridge Specials also have four cylinders, while the Schmidt Specials are of six-cylinder design. The latter are of the single sleeve valve type. Hamlin's entries will have front-wheel drive, as also will one, and possibly three, of the Miller Specials. All of the cars will be supercharged, either by Roots or turbine type blowers.

* * *

N. A. C. C. Pushing Fight Against War Taxes

THE automotive industry has made a good bit of progress in the last two years in its fight to have war taxes removed from its products. It has apparently convinced a majority of national legislators that such taxes are wrong on principle. But the fight won't be completed nor stopped until all of the remaining war and luxury taxes have been removed. The N. A. C. C. has submitted for approval of the U. S. Chamber of Commerce a resolution by which that body would go on record as favoring elimination of emergency excise taxes of the type imposed during the war as rapidly as the conditions of the national revenues will permit. That resolution ought to be approved by the U. S. Chamber at its meeting in Washington in May.—N. G. S.

Action of Springs Should Not Affect Uniformity of Transmission

With most types of drive, when the springs of the chassis deflect under road shock a slight angular motion is set up in transmission, either at engine end, road end, or both.

By P. M. Heldt

IT is obviously not desirable that deflection of the chassis springs should cause any motion of the transmission members of a car or truck, for if it does it means that in regular operation on average roads, where the springs deflect and rebound continuously there will be continuous acceleration and deceleration of one end of the drive or the other. Yet there is a certain amount of this interaction between the chassis springs and the drive with practically all forms of final drive, and the only thing that can be done is to try to reduce it to a minimum.

The objections to the effects mentioned are that they cause additional stresses in the transmission mechanism and may possibly produce slipping of the tires on the ground.

This subject is brought to mind by the description of a new German commercial vehicle chassis which has appeared in some of the foreign papers, in which a low frame height is obtained without resorting to the rather expensive and bothersome kick-up in the frame. The construction has other advantages, since it greatly reduces the unsprung weight at the rear and makes it possible to use in the propeller shaft a type of universal with only the least "universalling" action, since the axle is rigid with the frame and the universal joints need to compensate only for frame distortion.

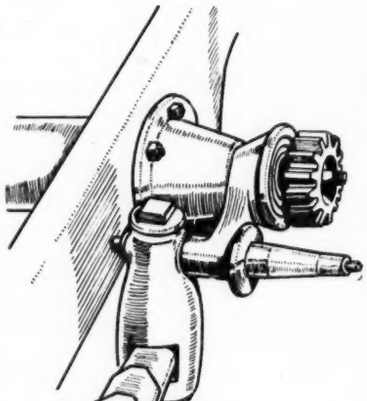


Fig. 1. Sketch of swinging stub axle used on Mannesmann-Mulag six-wheeled chassis

From the accompanying illustration (Fig. 1), it will be noticed that the rear axle, which comprises a stationary housing and live axle shafts therein, carries a crank arm at each end on which the rear wheel is mounted. This crank can swing around the axle housing, but its free end is restrained by the inverted semi-elliptic spring. Power is transmitted to the wheels by spur pinions at the ends of the axle shafts which mesh with internal gears on the wheels themselves.

Also Some Disadvantages

As might be expected, besides the advantages above enumerated the construction also has some disadvantages, and these are rather serious. If it were not for these disadvantages it would probably have occurred to some designer before. The disadvantages have to do with the reaction of the springs on the drive.

Whenever there is spring play, the arm supporting the rear wheel must swing around the rear axle center. If we regard the wheel axis as stationary, then the axle center will swing in an arc around this axis, and this swinging motion is accompanied by rotation of the rear wheel around its stub axle, or alternately, by acceleration of the engine.

A diagram of the rear axle drive is shown in Fig. 2. When the truck is at rest and normally loaded the center of the rear axle is undoubtedly substantially on the same level as the axis of the stub shaft, and that is the way the parts are shown in Fig. 2. The small circle of radius r, drawn in full, represents the pinion in its relation to the internal gear under these conditions. Now let us suppose that when in motion the wheel receives a shock so that the spring compresses. The effect of this will be that the frame is lowered relative to the position of the point of ground contact of the wheel, and since the axle is rigid with the frame, it will also be lowered. The axle, of course, is, and always remains, concentric with the driving pinion and when the axle is lowered the driving pinion assumes the position indicated by the dotted circle.

The amount of spring action or the deflection is represented by the distance OC, which is equal to

$$OX \sin BXA = (BX - BO) \sin BXA = (R - r) \sin \theta$$

When the pinion moves from the position indicated by the full line circle to that indicated by the dotted circle it rolls on the gear, and in consequence rotates around its own axis. The pitch point A on the pinion moves to position A′, and since in the original position the radius from the axis of the pinion to point A is horizontal, it is obvious that the angle of motion of the pinion around its own axis is represented by angle DOA′ or ϕ, which is equal to BOA′ — BOD. But owing to the fact that the arc A′B is equal to the arc AB, the angles subtended by these arcs bear to each other a ratio equal to the inverse ratio of the radii of the arcs. That is,

$$A'OB : AXB :: R : r;$$

hence,

$$A'OB = (R/r)\ AXB$$

But the angle through which the pinion rotates around its axis,

$$A'OD = A'OB - DOB$$

Since DOB=AXB we have

$$A'OD = (R/r)\ AXB - AXB,$$

and, finally,

$$\phi = [(R/r)\theta] - \theta = \left(\frac{R}{r} - 1\right)\theta = \left(\frac{R-r}{r}\right)\theta$$

From this equation it will be seen that the smaller r in relation to R — in other words, the greater the re-

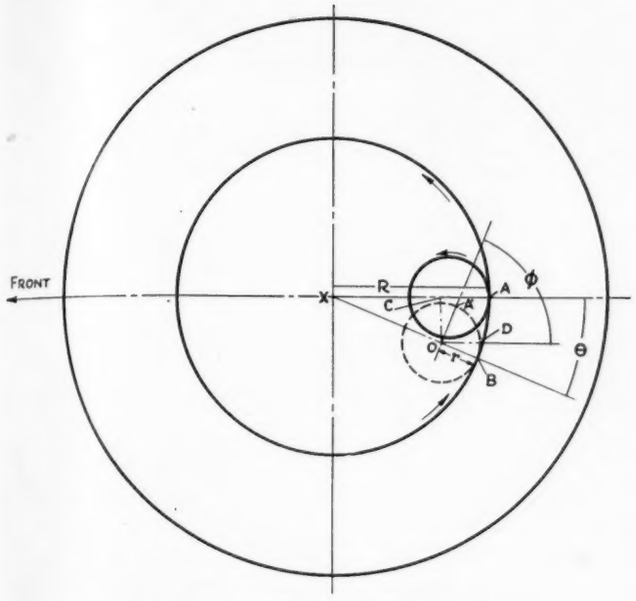


Fig. 2. Diagram of swivel-mounted stub axle

duction ratio of the pair of gears at the wheel — the greater will be the rotation of the pinion around its own axis, and, consequently, the acceleration of the engine, when the spring is depressed.

In regular forward motion the gear turns left-handedly and the pinion also turns left handedly, as indicated by the arrows. If the pinion rolls on the gear in consequence of spring deflection under load, it will turn left-handedly around its own axis, which means that the engine will be accelerated. We have here assumed that the wheel is rigidly "geared to the road" and that the road adherence is greater than the force due to the acceleration of the engine and flywheel at the required rate.

Of course, if the wheel were on slippery ground or if the car were driven at considerable speed over rough road, so that contact between tire and road were constantly interrupted, then the adherence between the tire and ground would evidently be less than the force of acceleration of the engine with flywheel, and instead of the engine being accelerated when the spring compressed, the tire would undoubtedly slip on the ground.

Similar Effect With Other Drives

A similar effect, of course, is produced with drives of all kinds. For instance, with a chain drive, when the rear springs compress, the chain winds up on the under side of the driving sprocket and unwinds from the under side of the driven sprocket, as shown in Fig. 3, which means that the driven sprocket—and with it the rear wheel—is moved in the reverse direction or decelerated, which is the same as acceleration of the engine.

With bevel gear and propeller shaft drive there is also a slight non-uniformity introduced in the drive by the spring action, but it is very much smaller than the degree of non-uniformity with chain drive. With shaft drive, moreover, the degree of non-uniformity depends upon the method of linking up the frame and the axle. With a Hotchkiss drive, for instance, the axle housing has a certain amount of angular freedom, and yields under the influence of any accelerating and decelerating forces.

The general effect of the inter-action of the springs and the drive in a construction like that shown in Fig. 1 is evidently of a complex nature. Since any spring action tends to produce acceleration or deceleration of

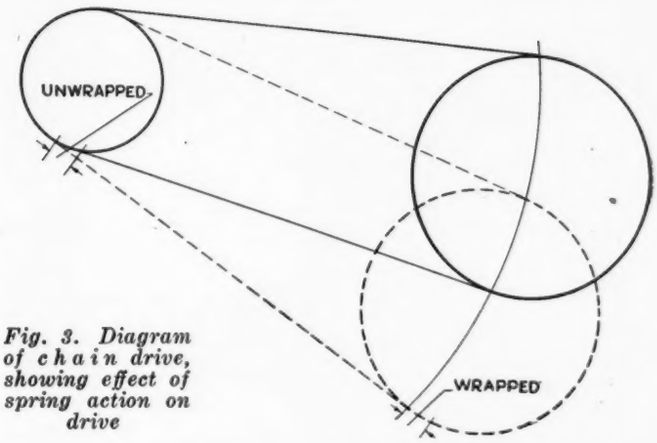


Fig. 3. Diagram of chain drive, showing effect of spring action on drive

the engine and wheel, the magnitude of which acceleration or deceleration is directly proportional to the speed of spring action, the latter will evidently be slowed down by the inertia of the car and of the engine. Aside from this the engine will be accelerated or decelerated and the car also will be accelerated or the wheel will slip.

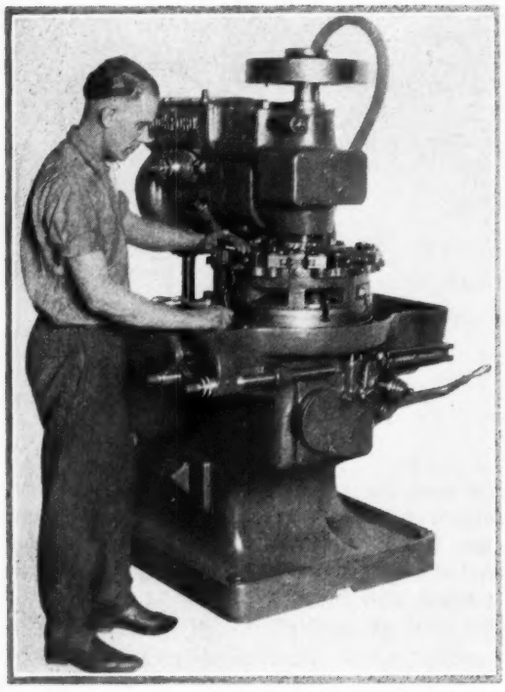
Spur Gear Would Help

The effect could be reduced by using a spur gear drive instead of one by internal gears. The result of this would be that the arm supporting the stub axle would be much longer and a certain up and down motion of its free end—in other words, a certain spring play—would mean less angular motion of the arm around its fulcrum and consequently less engine acceleration. There is, however, an accompanying disadvantage in this arrangement, because the cranked arm is subjected to torsional stresses, and if it were made comparatively long it would flex appreciably under these stresses, which would cause the driving wheels to spread at the bottom.

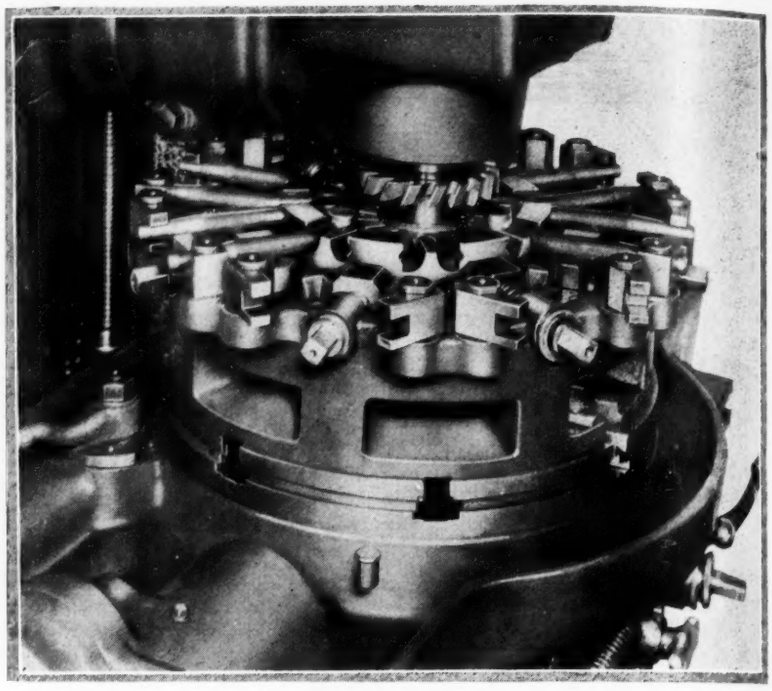
The interaction between the drive and the springs above discussed is objectionable because it increases the strains on the driving parts and tends to accelerate tire wear by causing the tires to slip on the ground. It is, possible, however, that by introducing flexible members in the drive and reducing the amplitude of spring motion these effects can be made negligible, so that the advantages of the arrangements are not nullified. The truck or omnibus chassis on which this drive is used is shown equipped with giant pneumatic tires, and the use of such tires would permit of reducing the flexibility of the springs.

Then, the connection from the driving wheel to the engine is a very long one, and by using shafts of high grade alloy steel of just sufficient torsional strength to withstand the highest torques that need be transmitted without permanent deformation, a considerable degree of flexibility can be obtained, and this could be further increased by mounting the internal gears free on the wheels and transmitting the drive to the wheels through steel spring, rubber or air cushions.

MOTOR caravan tours lasting two weeks and covering a 500-mile itinerary will be promoted in England this summer by a London firm. The caravan will be made up of three house-like trailers drawn by a pneumatic-tired Fordson tractor. One of the trailers will be fitted with a kitchen and a bathroom and the others will be used as lounging and sleeping quarters. Twelve passengers can be accommodated. It is planned to travel in a leisurely manner, covering about 40 miles a day.



Rockford Rigidmil with vertical milling attachment



Close-up view of rotary table for Rockford milling attachment

Rotary Table Unit Provided for Rockford Rigidmil Milling Machine

Fits on saddle slide after regular table has been removed. Vertical milling attachment also introduced.

MANY production milling jobs can be done most advantageously in a rotary fixture. Realizing this fact, the Rockford Milling Machine Company, Rockford, Ill., has provided a rotary table unit for its Rigidmil, which can be put in place on the saddle slide and becomes a part of the machine after the regular table has been removed. The bottom of the rotary table is planed to fit the regular table slide, which latter is used for the adjustment of cutter depth. A large oil pan is provided in the base.

The dive is taken from the same gear that is regularly splined to receive the table screw, which, in turn, through a train of gears and a clutch, drives the worm for the feed. Provision is made in this train of gears so that a range of feeds can be used that is satisfactory for the outer diameter of the table and also for milling at a smaller diameter. This change in range from the outer to the inner circle is made by removing the end gear cover, changing the position of one stud, and substituting the gears that are provided for the other range.

Ball Type Thrust Bearings

The worm is provided with ball type thrust bearings and is carried in eccentric bronze bushings, to provide means of adjustment for wear of the worm. A simple nut and screw arrangement serves to make the adjustment. The worm wheel is cast solid on the table and acts as a stiffening rib for the latter. The table has three bearings—one at the surface outside of the worm wheel, another slightly lower and inside the worm wheel, and the third on a circular gib which is accurately fitted and scraped into position, taking care of the radial duty and holding the table down. This permits adjustment for wear, by scrapping down the upper surface of the gib.

A nut on the front of the saddle adjusts a screw which regulates the cutter depth. The table is locked in position by a clamp which comes in contact with the gib on the saddle slide.

The worm and worm wheel are completely enclosed in a cored compartment and are submerged in a bath of grease. The table is lubricated by rollers in pockets identical to those used in the saddle slide for the regular table.

The base of the table is made in two sizes—a short one suitable for work that is milled at the inner position and a long one for work milled at the outer position.

Most rotary table work requires a vertical cutter spindle, and the company has brought out a vertical spindle attachment which is mounted on the regular spindle head, bolted to the arm in the upper position and clamped around the quill in the lower position.

A bevel pinion is mounted on the regular machine spindle and the mating gear on the spindle of the attachment. The spindle of the attachment is identical in the nose and in general dimensions—to the main spindle, and has a flywheel splined to the upper end for the elimination of chatter. The spindle speed for the attachment is one-half that of the main spindle. Although this attachment is very rugged and practically as rigid as if it were an integral part of the regular spindle head, it can be readily removed if it is desired to use the horizontal spindle.

We Shouldn't Be in Too Big a Hurry to Regulate Interstate Trucks

Federal control by interstate act would be premature at this stage. Industry should be given more time for natural development. Buses in a different category.

By J. A. Ritchie
President Yellow Truck & Coach Mfg. Co.

TO regulate or not to regulate?—that is the current question in regard to interstate motor vehicle traffic. For although 41 States do regulate intrastate traffic, there is as yet no interstate regulation as in the case of the steam and electric railroads.

The commercial transport of passengers and goods by automotive vehicles is a relatively new addition to our transportation machinery. The important thing to recognize is that it is a part of our national transportation machinery and, since it affects the electric railroads and the steam railroads, the nation has a very proper and deep concern in the basis on which it is or may be operated.

To depend upon individual competitive interest as a regulator is utterly to ignore the lessons of history. So, the question is not so much one of recognition of principle as it is of the application of the principle. Has the time arrived for it, and what should the necessary legislation provide?

About these questions there is a great divergence of opinion and it will take time to pass the inevitable period of heated controversy, to find all the basic facts and on them crystallize wise opinion in behalf of legislation making for the national welfare, upon which individual welfare depends.

In general, the interstate transportation agencies, electric and steam railroads, now under interstate regulation, feel that the new agency should also be regulated.

The organized motor coach operators feel the same way. Evidently some lessons have been learned from the cut-throat competition of the jitney period. Probably motor coach regulation now would not be premature, since the industry itself is for it.

But motor truck operators, for the most part, are opposed, if not to the principle of interstate regulation, at least to the bill now before Congress and indeed, any bill at the present time, and it is seldom wise to enact drastic laws with the opinion of the industry all against it. The psychological factor is one of great practical importance.

The truck operators argue:

1. That the total amount of interstate tonnage hauled by common carrier trucks in competition with the railroads is negligible, and, being all short haul traffic, is not profitable to the railroads anyhow.
2. That trucks cannot economically do a long haul business, and hence their operation, even though it involves crossing a state line, is essentially local.
3. That their rates average higher than railroad rates because they do the work quicker, pick up at point of origin of traffic and deliver at ultimate destination, and render other special services which railroads cannot render, and for these reasons their service is of special character and not wholly competitive with railroad service.
4. That automotive common carriers are not and cannot become a monopoly, since the customer, at all times, has the alternative of employing the private contract carrier or doing his own hauling, as so many industries are now doing.
5. That interstate regulation of common carrier trucks involves dangers to both private and contract haulage.

There are other arguments and one may grant the validity of most of them, though, frankly, many untenable arguments have been advanced, such, for example, as "the railroads have returns guaranteed by the government," a mis-statement that has been spread from one end of the country to the other.

Some of these arguments relate solely to the present situation, which is temporary, but we should also look at the future. Certain it is that the persistence of cut-throat competition at any time, in any form of public

WIDESPREAD interest attaches to the effort to put through the present Congress a bill for Federal regulation of trucks and buses in interstate traffic. And, as Mr. Ritchie states in this article, a great divergence of opinion exists as to the merits of the proposed legislation.

Mr. Ritchie's own opinion is that there are two distinct questions involved, one affecting trucks and one affecting buses. The principle of regulation he accepts.

He thinks the time probably is ripe for regulation of interstate bus lines, but pleads for more time before laying down hard and fast legislation for trucks.

His views are interesting as coming from one prominently identified with the manufacturing side of the industry.

transportation, either interstate or intrastate, is contrary to the public welfare.

The very nature of the motor truck business covering, as it will in several years, all of the highways of the country, will make it necessary that there be some regulation.

Before the States had State regulation, conditions were chaotic because each State gradually put laws on the books based entirely upon local interest.

When the Interstate Commerce Act came along it was so drastic and it was applied so ruthlessly that it began to injure the railroads and limit their ability to serve. The same thing applies to the supervision exercised over street railways in most cases by State Commissions and in some instances by the Interstate Commerce Commission.

We should aim to avoid all this in any regulation which is proposed for the motor coach and motor truck. The largest users of the motor coach and motor truck are going to be the steam railroads and the street railways.

We should ask the question, were this need of regulation put up to the steam railroads and street railways as applying to their own business, would they be inclined to suggest the same kind of regulation they have suffered, or would they not be inclined to offer many modifications which would give the railroads some latitude in authoritative and financial matters, and in management? Above all, we should ask them whether they would be inclined to subscribe to the principle that by law the net earnings of the steam railroads and street railway companies and their future automotive activities should be limited to a mere interest return on investment?

Should Have Time to Pioneer

The important thing for law makers to consider is what is best for the development of the nation's wealth and growth through the use of the motor coach and motor truck. Before the days of drastic regulation the steam railroads and street railway companies were able to pioneer. Isn't it well to arrange our laws in such a way as to enable this more modern means of transportation to do its share of pioneering?

If all this be true, then is it not the wisest thing for us to agree that regulation is a proper thing, but, to go slowly in working out its application? First ascertain what the motor truck and motor coach can do for the nation as a whole, then frame the law so as to permit them to do it.

It would be better to suffer another year or so of irritation and then enact constructive legislation rather than to act too quickly and suffer ever after from destructive legislation.

Thus far no mention has been made of the particular interest of the automotive vehicle manufacturers and it is an important factor in the problem.

Given a certain amount of service to be performed in any community, the provision of more facilities than are needed to perform that service represents an economic waste, which the ultimate consumer, in the end, has to pay for. To the manufacturer this can mean only one thing, a market filled with risk, or, to state it more strongly but just as truly, filled with certainty of bad risks with an unavoidable increase in the manufacturers' prices to take care of those risks.

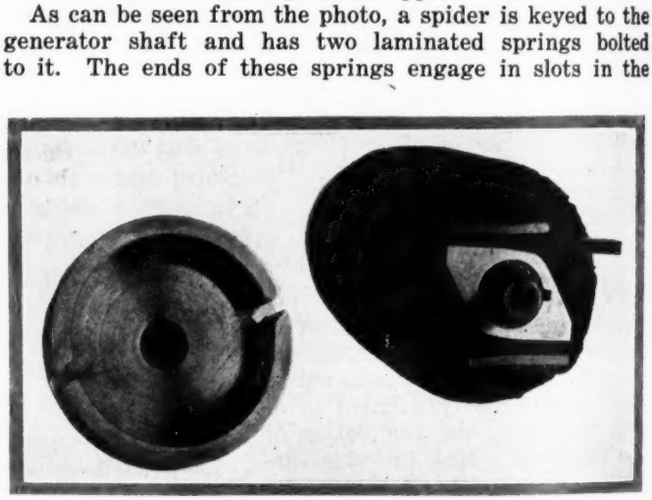
To sum the situation up as it now appears to us, the following conclusions seem justified:

1. That we cannot escape recognition of the principle of regulation.
2. Since the principle must be recognized our efforts should not be wasted in barren opposition, but centered upon constructive action.
3. That the time for regulation of the motor coach industry is generally recognized to be at hand and sufficient bodies of fact and competent opinion are available upon which to base a wise action.
4. That the situation in the motor truck industry is far different and that it would seem wiser to delay regulation in that department until a greater body of authoritative facts and a more general consensus of competent opinion in favor of regulation be attained.
5. That regulation should avoid the mistakes of previous regulatory acts and put the industry in position to pioneer, to earn adequate returns, and to realize its greatest possibilities for the benefit of the nation as a whole.

Flexible Generator Coupling

THE Air Service, Engineering Division, at McCook Field, Dayton, Ohio, has developed a special flexible coupling for generators as illustrated herewith. It is used in connection with the generators mounted on the liberty and other aircraft engines. The drive is from the end of the crankshaft opposite the propeller end, and there is considered torsional vibration, which has to be taken care of by the flexibility of the coupling. It has been found by tests that the coupling must yield 6 deg. in the direction of rotation and 9 deg. in the opposite direction.

As can be seen from the photo, a spider is keyed to the generator shaft and has two laminated springs bolted to it. The ends of these springs engage in slots in the rim of a driving member. The coupling is also made in another type having four laminated springs equally spaced around the circle. The same generator is used in connection with different engines. The largest generator takes 2 b. hp. to drive, and since the coupling has a capacity of 25 lb.-ft., it is amply large. The generators used by the Air Service are wound for 12 volts and have voltage regulation.



Driving and driven members of Air Service flexible generator coupling

THE Government of Morocco has introduced a sales tax on gasoline, inner tubes for tires, playing cards and matches. The tax on gasoline is at the rate of 10 francs per 100 litres (about 1.4 cents per gallon), while the tax on inner tubes is 150 francs per 100 kg. (25 cents per 100 lb.) In the case of the inner tubes the weight of the metal valve is not included.

Closed Bodies and Good Roads Complicate Engine Design Problems

Modern highways bring higher speeds and increased mechanical noises thus produced are amplified by present types of body, Henry M. Crane tells New York S.A.E. Remedies are discussed.

By Donald Blanchard

THE public demands an engine that is as unobtrusive as possible except in its effect in moving the car.

Meeting this requirement has been made increasingly difficult by the popularity of the closed car and our rapidly growing mileage of improved highways. The latter development has made higher speed operation possible, with an accompanying increase in noise and vibration which the closed body amplifies. Moreover, rapid acceleration and high gear hill-climbing ability are considered essential and, as a result, rear axle reductions have been growing larger which, of course, increase engine speed.

How the engineer can meet these requirements was discussed in a paper on passenger car engines presented before the Metropolitan Section of the Society of Automotive Engineers by Henry M. Crane, technical assistant to the president of the General Motors Corp., and past president of the Society.

Whether to seek smoother, quieter powerplants or to adopt a non-amplifying body construction is a question worthy of consideration concerning which Mr. Crane said that the right kind of body design would probably give quieter operation than anything that might be done to the engine. The amplifying characteristics of the closed body and the higher average operating speeds possible on our improved highways were given as important reasons for the growing use of the six-cylinder engine in the low-priced field.

Engine Revolutions Increase

There has been a steady increase in the average number of revolutions of the engine per car mile on direct drive. This tendency is a result of increasing car weights for similar types of service, a desire to reduce powerplant weight by taking full advantage of smoother running engine types and a demand for more rapid acceleration and better hill climbing ability. Formerly a high speed car was geared 2 to 2½ to 1, and made 1100 to 1300 revolutions per mile, while today there are cars in production requiring about 3000 revolutions per mile.

The power developed by a cylinder depends on its ability to draw in a charge and the mechanical ability of the engine of which it is a part to operate at a large number of revolutions per minute. As the number of cylinders increases, assuming constant total displacement for the engine, there is a very rapid gain in both of these qualities. A small cylinder can be filled more completely at much higher speeds and maximum speed from a mechanical standpoint is also greater. In addition, higher compressions can be used in small cylinders due to their better anti-detonating characteristics. On the other hand, leakage and frictional losses are greater in the small cylinder.

In the L-head engine, design of valves, ports and cooling is cramped unless cylinder spacing is made greater than required by other considerations. However, Mr. Crane stated that he considered it entirely possible to get good valve design in L-head engines for commercial passenger cars for the reason that other considerations have a greater restraining influence on maximum speed than the valves. For racing and other uses requiring maximum power output, the speaker said the valve-in-head type was in a class by itself.

Torque Reaction and Vibration

At low engine speeds, vibration due to torque reaction is probably more important than that due to unbalance, although in engines of six or more cylinders it also is relatively unimportant. In a rigid structure, if the center of gravity of the moving parts is stationary, there will be no vibration due to the inertia of these parts. However, the automobile engine is not a rigid structure and vibration develops even though the center of gravity of the moving parts does remain stationary. The forces developed by the inertia of the moving parts are not in the same plane and consequently tend to distort the crankcase. If this member lacks proper rigidity, annoying vibrations will result.

It is possible to secure a high degree of local balance by means of counterweights but such remedies tend to increase torsional vibration of the shaft as they lower its period. On the other hand, if the shaft is made very stiff by the use of heavy cheeks and crankpins, it helps from the standpoint of torsional vibration but makes conditions worse in respect to local balance. Making the stroke short is an advantage as it permits a very stiff crankshaft design and also reduces local unbalance.

Variations in the type of explosion cause large differences in the torque reaction in engines of the same size and number of cylinders. This is called roughness. It sometimes appears as a shuddering feeling at wide open throttle and often is accompanied by bumping. This action becomes less noticable as the number of cylinders increase. The trend toward higher compression makes for roughness and Mr. Crane expressed the opinion that this tendency was due to a desire to get more power and speed rather than gasoline economy.

Crankshaft Design Important

Proper crankshaft design is probably the most important feature in any multi-cylinder engine. The performance of particular engines has frequently been limited by one undersize bearing or by undue vibration caused by a flimsy, badly supported crankshaft. The center bearing on both four and six-cylinder engines have been notable sufferers from this fault in design.

If very much greater power should be needed in motor car engines it is possible that the twelve-cylinder type might make a place for itself. But in engines of less than 500 cu. in. displacement it offers very slight advantage, if any, in performance over several other types having a smaller number of cylinders. Consequently its use is not warranted as it is expensive and complicated in construction and operation.

To show the relation between the loads imposed on the bearings by the gas pressure and the dynamic forces, Mr. Crane showed a number of diagrams illustrated practically all the types of crankshafts in use at present. These diagrams emphasized the importance of proper analysis in engine design so that adequate bearing areas would be provided.

At high speeds, noise must be expected. However, other noises developed by the car obscure engine noises at high speeds and consequently the quietness of the powerplant at part loads is of major importance. Mr. Crane recommended plenty of oil and adequate bearings as the best means of reducing noise.

Standardization in Germany

ACCORDING to a report of the Robert Bosch A. G., much still remains to be done in the way of the standardization of automobile parts in Germany, though a great deal has been accomplished already. It is necessary that car manufacturers in placing their orders with parts makers should conform to general standards instead of insisting upon parts designed to meet their own personal views. What degree of simplification would be possible if this principle were more largely adhered to is shown by the fact that the Bosch firm at present builds 44 basic types of ignition apparatus, while with the cooperation of car manufacturers this might be reduced to six or eight.

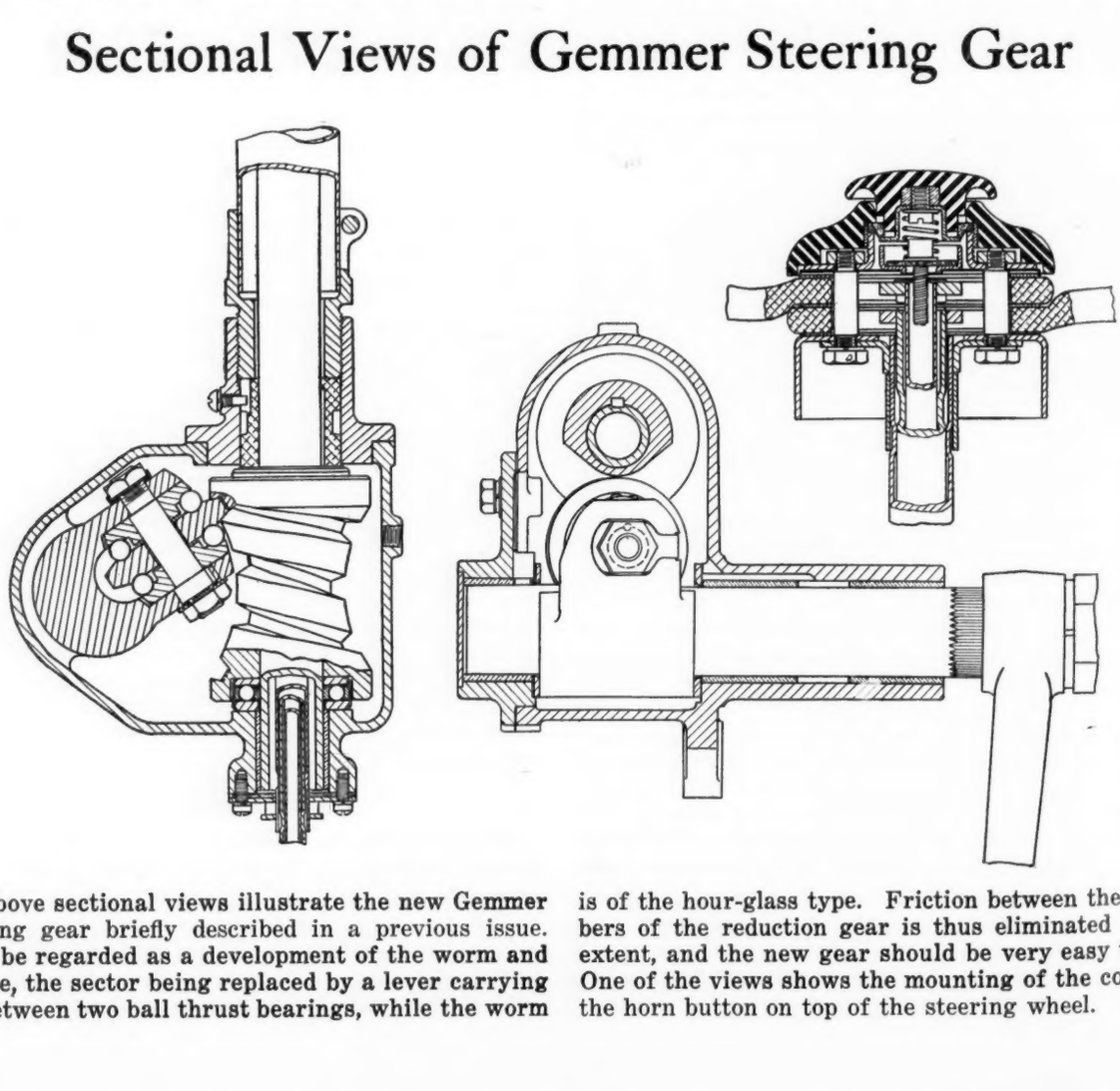
Even the forty-four basic types are not absolutely definite and unchangeable; on the contrary, important variations are made in them to meet different requirements—or whims. The armatures of the machines are made in 271 different designs and the stock to be carried is enormous; 12, and at most 15 or 18, would be sufficient.

Variety of Ignition Timing

Another point is that the present status of engine design makes necessary a great variety of ignition timing and both directions of rotation. This necessitates timing levers which even today must be kept in stock in 300 different designs. This however is already a great improvement, as 700 were required only a few years ago. It is estimated that thirty levers would meet all requirements.

These few examples show that, contrary to the general impression, the Bosch firm does not have the quantity production which would be possible if manufacturers would refrain from insisting upon special designs. Owing to the lack of mass production it is at present impossible for Bosch to work on the conveyor system as used in America, but a simpler form of "flow production" is possible and has been adopted. The results obtained with this system are quite important and show that it was a step in the right direction.

Sectional Views of Gemmer Steering Gear



THE above sectional views illustrate the new Gemmer steering gear briefly described in a previous issue. This may be regarded as a development of the worm and sector type, the sector being replaced by a lever carrying a roller between two ball thrust bearings, while the worm is of the hour-glass type. Friction between the two members of the reduction gear is thus eliminated to a large extent, and the new gear should be very easy to operate. One of the views shows the mounting of the controls and the horn button on top of the steering wheel.

Balloon Tires Recommended for Heavy Commercial Vehicles

British tire engineer says increase of 25 to 30 per cent in section with corresponding decrease of air pressure will go far toward lengthening tire life. Other changes suggested.

FOR better utilization of pneumatic tires on heavy duty vehicles brakes and brake gear should not be attached to or be a part of the driving wheels—such parts should be sprung and not unsprung.

The differential gear, if used, and the major portion of the final reduction gear should be no longer unsprung.

Each wheel should be independently connected to the chassis and should have no lateral displacement in relation to the chassis.

Wheels and tires of smaller diameter than are now standard should be used so that lower loading platforms may be provided and wheel revolutions increased for a given speed.

For any given tire load, tire sections should be increased and inflation pressure reduced in order to bring weight carrying vehicles in line with the riding improvements obtained by use of low pressure tires and to reduce road maintenance.

These suggestions were made by Colin Macbeth, tire engineer, Dunlop Tire Co. of England, in a paper read before a recent joint meeting of the Institute of Automobile Engineers and the Institution of the Rubber Industry. The suggestions were based on the following factors which, Mr. Macbeth said, were the main obstacles to the use of pneumatic tires for heavy loads under present conditions.

1. Wheel loads beyond the capacity of single pneumatics as commonly made.
2. Difficulty of providing twin pneumatics without interference with load or available width and without serious overloading of individual tires.
3. Complication as to spare equipment entailed by using different size tires on various axles of the same vehicle.
4. Difficulty of fitting pneumatics of reasonable capacity without undue height of loading platform.
5. Difficulty of reducing wheel diameters without interference with brake gear.

Following is an abstract of Mr. Macbeth's paper with explanations of some of the charts with which it was illustrated:

The main reason for the success of the pneumatic tire lies in the fact that it provides a wheel with a yielding periphery. It is true that the solid rubber tire also yields at its point of road contact when encountering irregular surfaces on the road, but to yield to the same extent as a pneumatic tire under the same conditions would entail the use of a much greater weight of rubber and a corresponding increases in weight of wheels and other unsprung parts, moreover overheating would destroy the tire.

Many inventors have sought—and still seek daily—to use solid rubber tires in conjunction with "spring" or "suspended" wheels of various types, having yielding spokes, intermediate rubber buffers, etc. The idea underlying all these inventions has been to add to the ability of solid tires to give vertical displacement under load.

Such "spring" or "suspended" wheels are wrong in principle; they having a comparatively rigid periphery which does not appreciably yield from its circular form. When run at speed the whole periphery of the wheel is displaced vertically by road obstacles whereas the pneumatic type periphery yields locally sufficiently to enable it to absorb the great bulk of normal road obstacles without "passing on" much vertical motion to the wheel hubs, etc. In effect the only part of the vehicle which is quite unsprung is the part of the tire actually in contact with the road at any one time.

Solids and Pneumatics

Solid rubber tires transmit a blow reaching sometimes seven times the intensity of that transmitted by pneumatic tires, the intensity of the solid tire blow being due to the very small area of contact and the very small vertical yield of tire tread.

We see today new uses for mechanically propelled vehicles, as over soft ground, rough ground, etc., where the caterpillar track is made use of. These vehicles are making extended use of one of the principles which have made the pneumatic tire successful as compared with steel tires and solid rubber tires, viz., the long contact feature. The pneumatic tire provides a modified caterpillar track on each wheel.

The pneumatic tire is now accepted as desirable for modern passenger carrying services on all but purely city routes. They are not yet, however, a practical proposition on the heavy freighter for long or short distance work.

The six-wheel chassis overcomes a number of the major obstacles to the extended use of pneumatics for heavy loads.

It reduces wheel loads to a figure which enables greater total loads to be carried per automobile.

Lateral tire interference is only some 60 per cent of that when using twin pneumatic tires.

Spares need only be of one size suitable for any wheel on the vehicle.

But the six-wheel chassis leaves still with us these obstacles—

High loading platform.

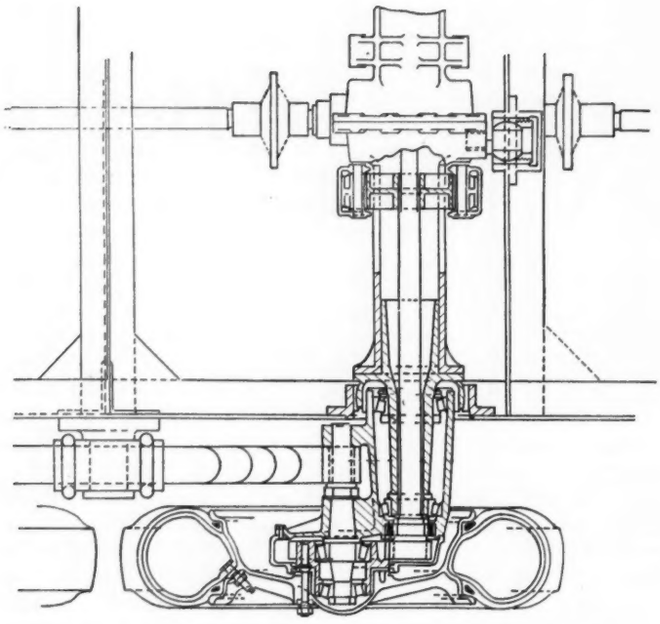


Fig. 1. Arrangement of axle and wheel in stub axle method of decreasing weight of unsprung parts

Large wheel diameters due to brake accommodation.

Taking up the suggestions for improvement in order as written the following points arise:

Taking the brake gear away from the wheels means that transmission parts will be subjected to braking loads to which there is a very natural prejudice on two axle automobiles today. On the other hand we know that many hundreds of thousands of vehicles have done 90 per cent of their braking through the transmission and two wheels only without ill effect.

Brakes divorced from unsprung parts will very appreciably reduce unsprung loads, and, in addition to reducing shocks transmitted to road way and sprung chassis parts, will eliminate variation in the braking action due to axle movements as commonly occurring today.

If the differential gear and the final reduction are sprung parts we can take away from the unsprung parts those members which today—due to their being centrally located in a beam—require the driving axles to be of girder like stiffness, very heavy, and so cause pounding and hammering to such a degree as to set up great forces acting in nearly every direction about the axle attachment points.

The independent attachment of each wheel is no new thing for lighter vehicles—for heavy vehicles its successful adoption would appear to depend on a satisfactory means of power transmission to, and springing of, such independent wheels. The conditions for springing should be good as the spring attachment need take no account of either lateral or twisting movements.

A reduction in wheel diameters with solid tires entails a great increase in the intensity of shock transmitted to the axles due to road irregularities, but when fitting modern section pneumatics the increase due to reduced diameter becomes of little moment as the tires absorb the bulk of the road irregularities.

Room for Improvement

Increased tire sections and reduced inflation pressures are the rule on almost all the private passenger cars built and while there has been a notable drop in the pressures in large pneumatic tires during the last few years, yet there is lots of room for improving the shock absorbing powers of such tires as commonly fitted today.

For given loads an increase in section of some 25 to 30 per cent with a corresponding reduction of air pressure and a well proportioned tire designed to suit will go far towards ensuring longer tire life, greater comfort and better unsprung load condition.

(The method suggested by Mr. Macbeth for decreasing the unsprung weight is that of providing a stub axle carrying the wheel while the main axle is entirely spring suspended. The theory of this application and its advantages and disadvantages are discussed by P. M. Heldt elsewhere in this issue.

Fig. 1 shows the arrangement of unsprung parts according to this scheme. The rocker is mounted on Timken bearings about a sleeve on the rigid axle in the same way as is used in common full floating axles. The wheel is mounted detachably on a sleeve as in an ordinary front wheel and the sleeve has a gear wheel attached to it.

The pinion is preferably of a double helical type, Mr. Macbeth said, and is mounted on a bearing which is, in turn mounted on the rocker and is at all times concentric with the stub axle and in alignment with the gear wheel. The spring attachment is by a link to an extension of the stub axle.

Fig. 2 shows a similar arrangement to suit a six-wheel chassis and it will be noticed that while the axle is held positively in the frame it allows fully for any frame dis-

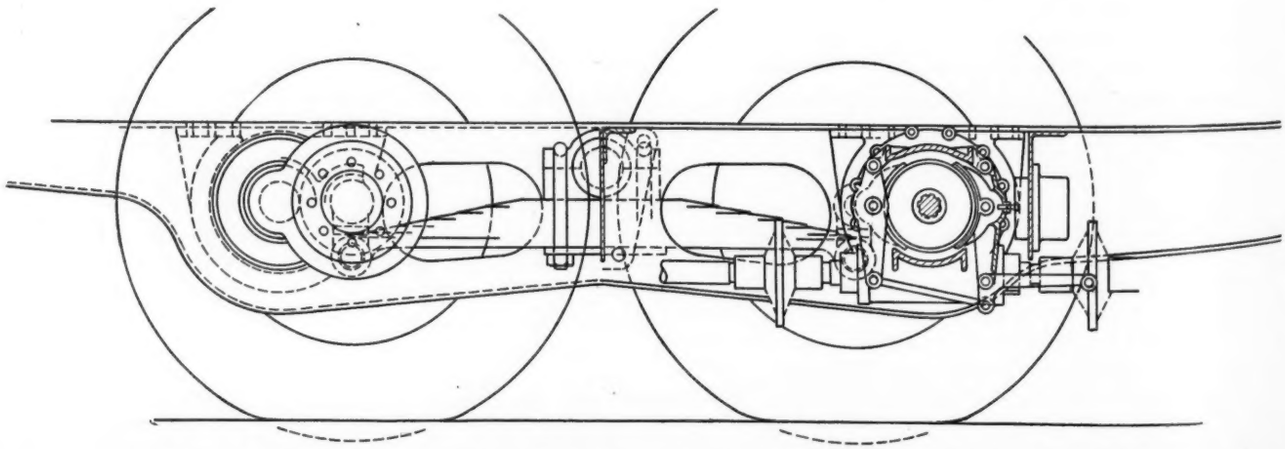


Fig. 2. Side view of same arrangement shown in Fig. 1, as adapted for a six-wheel vehicle

tortion as the sliding side connections and the sliding torque bearings support the axle at three points, thus taking all brake and torque loads.)

The balloon tire conforms most closely to what it would be feasible to utilize with the arrangement proposed and in Fig. 3 is shown a comparison of an eight inch high pressure tire as commonly used and one of similar section suitable for 1 ton load deriving all the advantages of a low pressure tire.

Here we see a combination of tire and rim having the following features:

(a) Same effective radius at the tread as H. P. section.
(b) A lighter tread not in proportion to the lighter load carried.
(c) With 6 or 8 plies instead of the usual 10 or 12 on the high pressure tire.
(d) With strong but sufficiently flexible bead to allow reasonable ease in handling.
(e) With a rim flange giving same distance between road and rim as with the H. P. section.
(f) With bead seat diameter increased one inch in diameter as compared with flange diameter on a H. P. tire rim. Thus getting more room inside wheel.
(g) With a well base rim of suitable depth for tire handling but arranged so that while at no time can two beads be down in the wall, yet the tire can be better handled than with a symmetrical rim.
(h) The valve will be at an angle as in the case with the modern well base balloon tire and thus the need for elaborate valves is overcome and the serious weakening of rims entailed by such valves also.

It should be noted that high pressure giant tires today have very bulky beads for two reasons:

1. In order to conform to the detachable flanges which have to be deep to provide sufficient strength to prevent twisting and distortion under very high inflation pressures and their consequent blowing off.
2. As a legacy from the practice of a few years back with commonly entailed pressures well over 100 lb. and when—due to lack of knowledge—many bead failures occurred which do not occur when manufacturing tires on the internal pressure system which gives a consolidated bead.

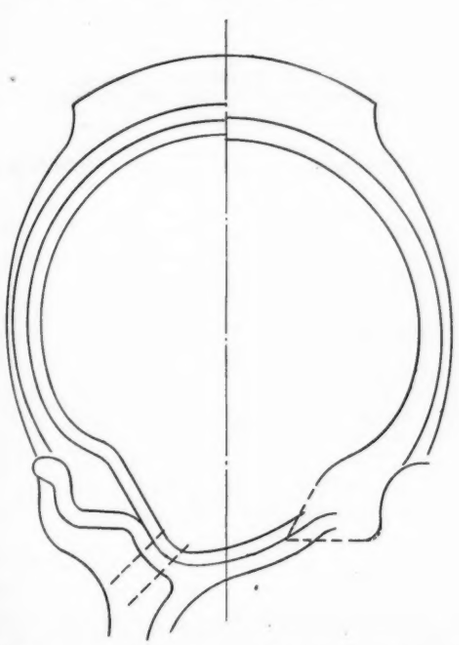


Fig. 3. Comparison of high and low pressure tire of similar cross section

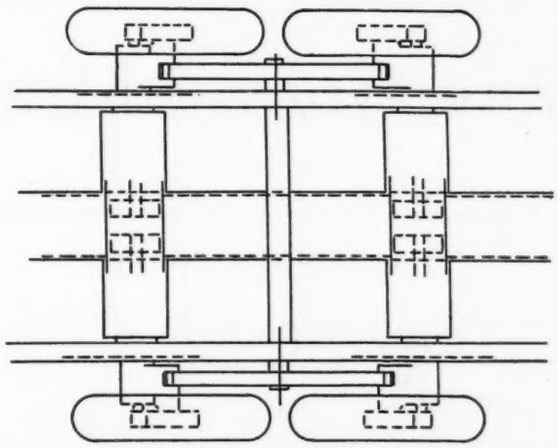


Fig. 4. To overcome objections to brake position in drive recommended by Mr. Macbeth, he suggested the gas-electric drive arranged with a motor for each wheel as shown here and with brakes on the motor shafts

There is undoubtedly an objection to the braking loads passing through the final gear though this should be robust enough to ensure no trouble. There will probbably be many comments as to the results of such a suspension on tire wear—personally I don't think either objection will prove serious. I would prefer to use an internal gear for final drive but the difficulty of making it oil and dirt tight is considerable.

To overcome the objection due to brake position I would bring forward the petrol electric transmission, and Fig. 4 shows such an arrangement where one motor is used for each driving wheel. In fact the rocker suspension would appear to invite the electric transmission.

No differentials are used, no universal joints and the brakes are on the motor shafts.

Cooling the Brakes

Such an arrangement would enable all four brakes to be located in a tunnel and thus cooled by leading fan blown and other air to concentrate a cooling blast on the brakes.

My remarks have centered round equipment for loads of 1 ton per wheel but they apply equally to much heavier wheel loads. We find today 8 in. pneumatics carrying two tons per wheel at 120 lb. air pressure and though this is above tire manufacturers wheel loads and air pressures, yet it shows that the heaviest vehicles are already seeking suitable pneumatic tires.

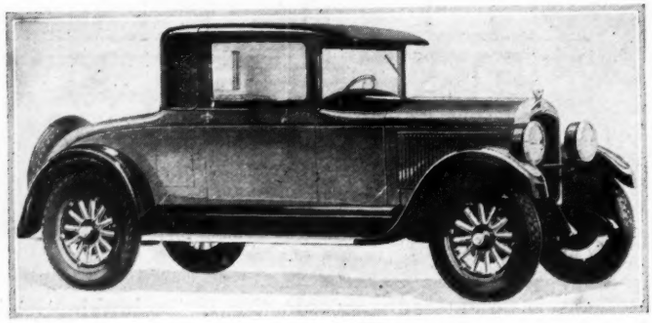
For heavier loads we can increase the strength and inflation pressure of 8 in. tires and thus meet the requirements of space available for tires and wheels but at the expense of reduced tire life and insufficient cushioning. If we adopt the low pressure tire for heaviest loads we can fit the following:

Wheel load	Tire section	Bead Seat diameter	Inflation pressure	Vertical deflection at 23%	Approx. effective radius
27 cwt	9 in. actual	19 in.	40	2.25	17½
30 cwt	9 in. actual	19 in.	45	2.25	17½
33 cwt	9 in. actual	19 in.	50	2.25	17½
36 cwt	9 in. actual	19 in.	55	2.25	17½

Low pressure tires above such wheel loads will be met by fitting 20 in. rims with 10 in. section tires, taking loads up to 2½ tons per wheel at pressures from 40 to 50 lb. The vertical deflection will be 2½ to 2¾ in. and the effective radius above 18½ in. Sections above 10 in. on 20 in. rims are not feasible without radical alterations in tire construction.

New *Spring* Models *Added by* Hupp,

THREE-PASSENGER COUPE



New three-passenger coupe on the Hupmobile six-cylinder chassis

Hupmobile

HUPMOBILE has extended its six-cylinder line by the introduction of a three-passenger coupe with a rumble seat in the rear deck. The cushion of the rumble seat is detachable, thus making the compartment available for the carrying of merchandise or other goods. This feature is expected to appeal especially to salesmen. The car is upholstered in leather and the exterior finish is in a special shade of green Duco. There is a small door on the right side of the body which gives access to a compartment for golf clubs and similar articles. Dash gasoline gage and shock absorbers are standard equipment. The list price is $1385.

This is the first new body model added to the Hupp six line since the introduction of the new chassis last year and particular attention has been given to the design to make it suitable either for business or pleasure purposes.

Roamer

TO the existing line of four, six and eight-cylinder cars, the Roamer Motor Car Co. (Canada), Ltd., has added a new and more powerful eight-in-line chassis on which two body models, a five-passenger sedan and a four-passenger coupe, listing at $1985, are offered.

Standard units are used throughout and such features as Lockheed hydraulic four-wheel brakes, 33 by 6.00 in. balloon tires and a wide range of de luxe equipment are included in the price.

A Lycoming 3¼ by 4¼ in. "L" head engine of 33.80 S.A.E. horsepower rating and embodying a 5 bearing crankshaft, cast iron pistons, and Link-Belt front end drive is employed. Generator, ignition and starter are separate and of Auto-Lite manufacture, with the battery a 6 volt Prest-O-Lite. The carburetor is of Schebler make with fuel delivered from a 15-gal. rear tank by the vacuum system.

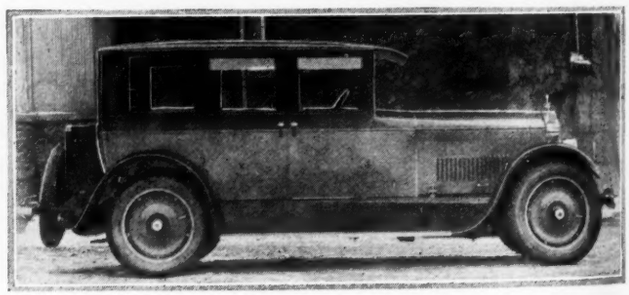
Both clutch and transmission are formed in unit with the engine, the former being a single plate Borg & Beck and the latter of Durston make with three speeds forward. Drive to the rear axle is through two metal type Mechanics universal joints and a tubular propeller shaft. The axle is of the ¾ floating type with spiral drive and of Salisbury make. Propulsion and drive are taken through the springs and the gear ratio is 4.63 to 1. Service brakes are hydraulically operated on all four wheels with the hand brake connected to a drum on the front end of the propeller shaft.

Ross Steering Gear

The front axle is also of Salisbury make with the steering gear a Ross cam and lever type. Springs are semi-elliptic all round with those on the front being 36 by 2 in. and those on the rear 56½ by 2 in. The shackles are of the conventional steel bolt type with chassis lubrication by means of pressure gun. Ready for the road the complete car weighs 3580 lb. The wheelbase is 126 in.

Conventional wood construction with steel panels is employed on both bodies. The interior is upholstered in mohair and velour with the exterior in two-tone lacquer. Standard equipment includes a one-piece windshield, disk wheels, automatic windshield, moto-meter, heater, rear view mirror, traffic signal, and trunk with rack.

FOUR DOOR SEDAN



The new Roamer four-door sedan listing at $1985. It is powered with Lycoming eight-in-line engine. Four-wheel brakes and disk wheels are standard equipment

Franklin

THE present line of Franklin Series 11 models has been supplemented by the addition of a four-passenger Victoria. The new model was announced this week, but

Dodge, Paige, Roamer *and* Franklin

the Franklin Automobile Co. states that deliveries are not expected to start until June. Like other models in the Series 11 line, the Victoria will leave the factory with complete equipment, including stabilators, balloon tires, front and rear bumpers, reserve gasoline gage, automatic windshield wiper, stop light, rear vision mirror, air cleaner, gascolator, clock, and spare tire and tube.

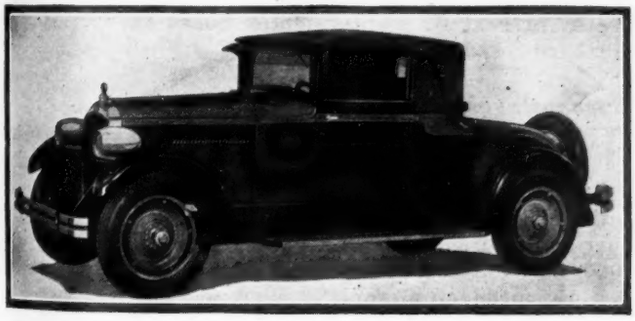
The Franklin Co. also announces a wider selection of body colors for its various models, which now include a sedan, Oxford sedan, auxiliary seat sedan, sport sedan, coupe, rumble seat coupe, sport runabout, touring, enclosed-drive limousine, cabriolet and the new Victoria. The price of the latter is not announced at this time.

Paige

STRIKING lines, colors and appointments embodied in a new Paige cabriolet listing at $2295 make this model the most distinctive in the line of the Paige Detroit Motor Car Company. As the tan-colored top is collapsible and rumble seats are provided, the new car may be used as a roadster. It is the first open car to be offered on the new Paige chassis.

Doors of this model are of the closed car type with the regulation window lifters. When the top is down the upper frame of the door folds flush across the window sill giving the appearance of a custom-built roadster. A sun visor is built integral with the frame supporting the one-piece windshield and this arrangement insures a snug fit of the top and door frame when the car is used as a cabriolet. One person can convert the car from one type to the other in a few minutes and the rear deck can be opened from a latch inside the front compartment.

CABRIOLET

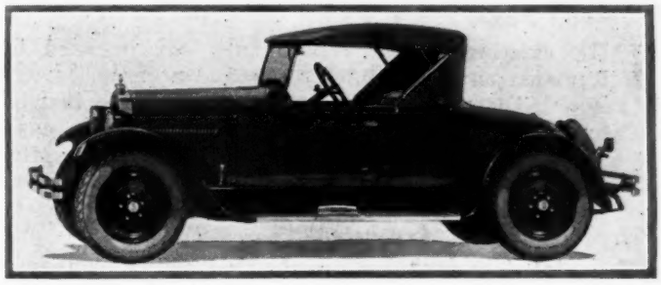


The new Paige cabriolet which is fitted with collapsible top and may be used as a roadster

The interior upholstery, including the seats in the rear deck, is in Spanish leather with a decorative design embossed in the surface, while the interior hardwood trim has a unique inlaid design. Exterior colors are sea fog gray and ocean blue lacquer with the darker shade below the belt line. Nickeled bullet-type headlights to match the radiator and changes in the contour of the belt line give the car a pleasing appearance. Bumpers in the front with bumperettes at the rear, cowl lights, automatic windshield cleaner, stop light and rear view mirror are included in the equipment.

The cabriolet is in addition to the new Paige two-door brougham announced in *Automotive Industries* several weeks ago. The brougham is on a special 115-in. wheelbase and lists at $1295. Although employing the same engine, clutch, transmission and four-wheel braking system as the standard 125-in. Paige, modifications were made in the frame, tires, springs and axles. The body is built along characteristic Paige lines and carries the same range of equipment as the larger models.

SPORT ROADSTER



Dodge's latest model is this two-passenger sport roadster which lists at $880

Dodge

THE new Dodge roadster shown above was announced in our news columns last week. It is a two-passenger sport model listing at $880 and is patterned after the standard and special Dodge roadsters but is distinctive in color, upholstery, top and in nickel trim. Body and hood are done in pheasant green with partridge striping. The balance of the car is in baked enamel. Gray Spanish leather is used for upholstering. The folding top is of tan-colored material. Bullet-type headlights are fitted. Natural wood wheels are standard but disk wheels will be furnished when desired at no extra cost. Accessory equipment includes front and rear bumpers.

Here and There in Foreign Markets

By special arrangement with the Automotive Division, Bureau of Foreign and Domestic Commerce

Rumania Taxes c. i. f. Value

THE existing 10 per cent luxury tax imposed by Rumania on automobiles, tires and accessories will be computed from the c. i. f. value of the goods, instead of from the invoice value as was previously the case, according to a recent statement of the Rumanian Ministry of Finance.

Prices Double in Argentina

IT is stated in consular reports that owing to uneven distribution of selling costs and profits in Argentina, many cars are selling out of line in relation to their class prices in the United States with result that sales volume has been curtailed at the expense of the manufacturer. The retail prices of automobiles in Argentina, it is said, range from 56 to 127 per cent higher than the list prices on the same models in the United States. This condition may be attributed to numerous costs and charges which are added along the way from the factory to dealers' show room, and to high profits sometimes made by the importer.

Colombian Road Expenditures

A TOTAL of $2,100,000 was spent on Colombian highways in 1925, $1,100,000 by the National Government and $1,000,000 by the Departmental Governments, acording to Dr. Caicedo, former Director of National Highways.

Vienna Market for Road Oil

VIENNA uses annually 2700 tons of mineral oil for road surfacing. The oil, called "Impregnol," is derived from the crude oil "Gasol," imported chiefly from Rumania, and is believed to be inferior to American products so used. If American producers could meet competitive prices, they might find an enlarging market. Use of "Impregnol" has recently extended to other Austrian cities.

Regulations for French Salon

REGULATIONS for the 20th French Automobile Salon to be held next October 7-17, at the Grand Palais, Paris, have been announced. Prices for exhibition space have been increased to 600 francs per square meter in the central portion of the hall; 250 francs per square meter in the remainder of the ground floor; and 360 to 480 francs per square meter in the balcony. The maximum space allotted to any one French firm cannot exceed 120 square meters. The maximum space open to any one foreign exhibitor will be 80 square meters.

Bus Market in Egypt.

ALTHOUGH motor buses are well introduced in Egypt, the market has been thus far only slightly exploited, Trade Commissioner Richard A. May, Alexandria, informs the Automotive Division of the Department of Commerce. Bus services in the cities of Alexandria and Cairo are being increasingly profitable to their owners and operators. New bus lines are being gradually opened up, mainly by exclusive concessions in the cities, and between villages and cities. One American manufacturer estimates that the Egyptian market will absorb 2200 light weight chassis in 1926, an increase of fifty per cent over 1925 business. This demand will be approximately two-thirds for bus purposes and one-third for truck units—all bodies being manufactured locally. Standard bus specifications and body construction are generally being demanded by local and municipal governments.

U. S. R. Buys Swedish Buses

AN order for six motor buses similar to those now being used by the Swedish Post Office authorities for mail transportation in northern Sweden has recently been placed with the Swedish automobile manufacturers by the Soviet government. These buses, which are intended for mail carrying in northern Siberia, are equipped with a special rear wheel caterpillar arrangement for negotiating rough roads and deep snow, have skiis on the front wheels, and exceptionally powerful motors. A snow plow attachment is also provided. There are at present 34 similar motor buses in operation in northern Sweden.

Czechoslovak Factories Busy

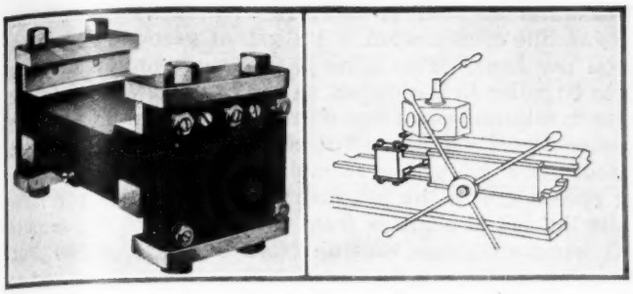
THE Czechoslovak automobile factories are working at capacity, with the demand for cars so brisk that it has been impossible to accumulate stock for the usual active market in the spring. During 1925 the total production of passenger cars and trucks in this country was 5000, as compared with 3400 in 1924, and it is estimated that the production for the current year will be 6500. This increase has been made possible, not through the enlarging of plants, but through the installation of modern machinery and equipment during the past year.

Activity in China

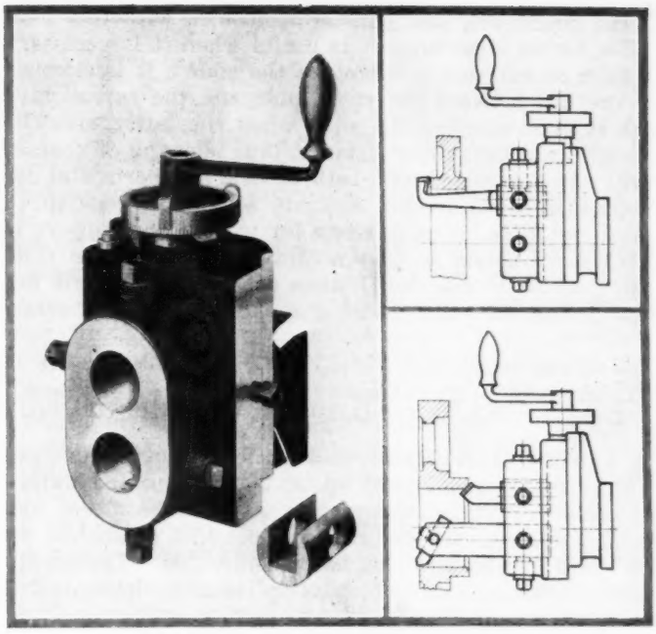
A CABLE from Peking, China, says that road building and motor transport in the Hupes Province have received considerate action recently from military authorities. "Profits from motor transport of opium and passengers" says the cable, "are stimulating the military to build more roads with forced soldier labor. Many second-hand cars have been purchased at Hankow and converted into buses. Bodies built locally cost from one hundred fifty to two hundred gold dollars."

Uruguay Business Grows

THE sale of American automobiles and trucks in Uruguay continues to increase at a very steady rate. The 5736 cars imported during 1925 were valued at 2,086,075 pesos and represented an increase of 2063 or 56 per cent over the number imported the year before, while the 707 truck chassis imported during the past year indicated a 40 per cent increase over 1924.



Turret slide support, with drawing, showing provisions for adjustment



Vertical slide tool and drawings, showing its use in back facing and in boring and chamfering operations

Three Turret Lathe Tools Are Added to Warner & Swasey Line

Vertical slide tool, multiple head cutter and turret slide support announced for No. 4 and No. 6 lathes.

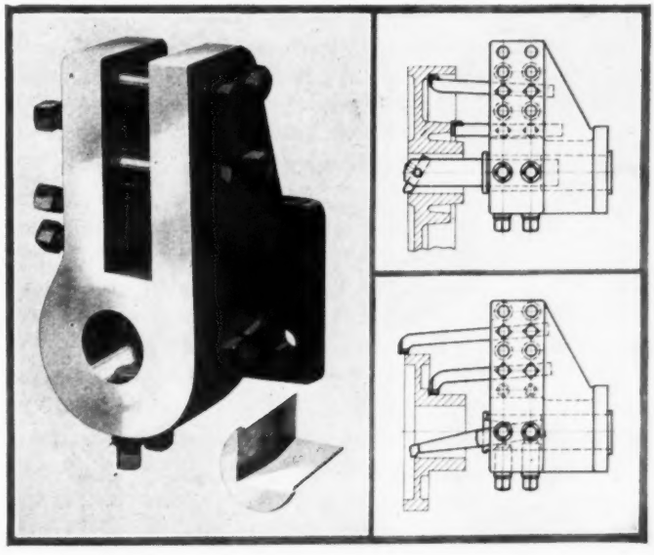
A COMPLETE line of tools for its No. 4 and No. 6 turret lathes is being worked up by the Warner & Swasey Company, and several additions to this line have just been announced. These tools make possible multiple and combined cuts, and were designed to ensure the greatest degree of rigidity. The tools are manufactured on a regular quantity basis to bring down the cost to the consumer and to enable the average shop to have a set of tools that cover a wide range of work.

Among the new developments is a vertical slide tool, a rigid turret tool for recessing, back-facing, boring, chamfering and similar operations. The slide proper is provided with a large micrometer dial which permits quick and accurate re-setting. Clips are provided which can be placed on any indication for re-setting purposes. Forged cutters can be set by the use of a split bushing. The two holding set screws at right angles to each other assure proper bearing surfaces for the cutters. When boring bars are to be used the split bushing is removed. The two line drawings illustrate a few of the operations for which this tool is particularly adapted. A taper gib compensates for wear and increases the rigidity, and a binder screw clamps the slide rigidly.

Multiple Cutter Head

A multiple cutter head is adapted to perform turning, facing, chamfering and boring operations at the same time that the tools carried by the cross slide are cutting. The vertical construction avoids interference of the cross slide. Inexpensive forged cutters can be used, and are held in the vertical slide by set screws so that each cutter may be set and adjusted independently.

The tools are made from a steel casting and are very rigid. A series of tie screws and bushings are provided which prevent the sides from springing apart when the forged cutters are clamped in place. These can be shifted to the various holes to allow for any number of positions that are necessary for locating the cutters. A rocker bushing provided for the center hole allows the use of square shanked forged boring cutters. The four holding set screws, at right angles to each other, provide substantial bearing surfaces for holding the cutters. This is shown in the line drawing illustrations, which also show several



Multiple cutter head and drawings, showing its use in boring and facing and in turning and boring operations

of the operations that can be performed with this tool.

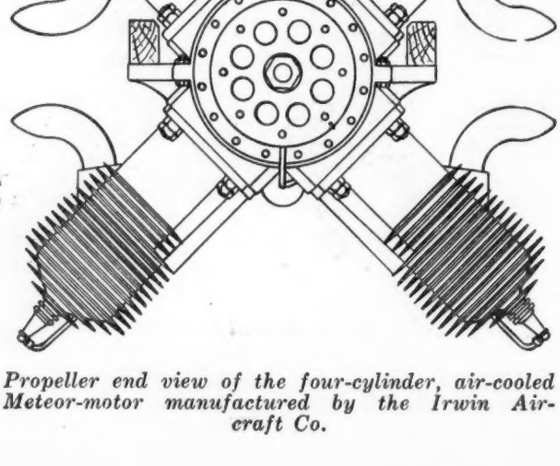
The turret slide support is useful when it is necessary to have an extreme overhang of the slide. It is clamped on the bed between the cross slide and the turret unit. The support steadies the slide when the latter must be extended a considerable distance, thus allowing of coarser feeds. It is provided with both vertical and horizontal adjustments, which permit accurate setting in relation to the turret slide, to compensate for wear. The support is particularly useful in conjunction with the vertical slide tool (previously described) when overhead piloting is impossible and when the overhang of the turret slide is great.

Air-Cooled Aero Engine Weighs 60 Lb.

A FOUR-CYLINDER air-cooled aircraft engine for light planes, developing 20 hp. at 2000 r.p.m. and weighing complete with carburetor, magneto and propeller hub about 60 lb. has been designed and put into production by the Irwin Aircraft Co. of Sacramento, Cal. The crankshaft of this engine, which is called the Meteor-motor model 72, weighs but 6½ lb., although it is machined and ground from a 90 lb. piece of chrome vanadium steel and is of the two throw type. Tubular connecting rods with steel-backed babbitt bearings are used. Although the pistons are of cast iron, they weigh only 14 oz. complete with three rings. Valves are of tungsten steel, while the cylinders are of gray iron machined both in and outside, while the cooling fins, which are of copper, are welded to the castings. The crankcase which is fitted with four mounting brackets is of silicon aluminum. Both main and thrust bearings are of the ball type, lubrication being by the pressure system with the pressure variable through a dash control. A Zenith carburetor and a Bosch magneto are part of the equipment of the engine, all units being easily accessible without taking the motor out of the frame. Installation dimensions of the engine are as follows:

Largest diameter (spark plug to spark plug) 33 in.
Distance between flange bolt holes (width) 8 7/8 in.
Distance between flanges bolt holes (front to back) 5 in.

Installed in the various types of light planes manufactured by the Irwin Aircraft Co., a top speed of from 70 to 95 miles an hour is obtained with this engine, while the gasoline consumption is 1½ gal. of gasoline and ½ pt. of oil per hour. This gives a fuel consumption of from 40 to 50 miles to the gallon, as the cruising speeds of the ships mentioned run from 60 to 80 miles per hour. The excellent performance of these ships equipped with a Meteor-motor is further exemplified by the fact that landing speeds are in the neighborhood of 30 miles per hour while the initial climb is from 400 to 500 feet per minute with service ceilings varying from 10,000 to 17,000 feet.



Propeller end view of the four-cylinder, air-cooled Meteor-motor manufactured by the Irwin Aircraft Co.

Standards of Cylindrical Fits

A VOLUME dealing with the standards for cylindrical fits of the German Engineering Standards Committee has recently appeared in a second edition, the first edition having been issued in 1923. Previous to the adoption of these standard fits several different systems were in use in Germany, differing with respect to the reference temperature, the zero line and other details.

Commenting on the new standard fits, a reviewer of the book referred to, in *Engineering*, says that the standard temperature, which with the systems formerly in use was 0, 14 or 20 deg. C., is now 20 deg. (68 deg. F.), which is the general standard temperature of the Continent and also of the United States, against the 62 deg. F. (16 2/3 deg. C.) of the British Empire. The question of shaft or hole basis—unit shaft or unit bore, as it is termed in Germany—remains under discussion, and attention is drawn to the combination and exchange systems of Gottwein and of Pfleiderer.

As a reference or zero line, either the symmetry axis or the lower tolerance limit on the hole basis, and the upper limit on the shaft basis, may be chosen. The book adopts the latter suggestion as generally more lucid and simple, specially when several grades of fits are recognized. The B. E. S. A. distinguishes three classes of fits: the clearance fit (where there is a positive allowance between the largest possible shaft and the smallest possible hole), the interference fit (with a negative allowance, and obstruction, between the largest hole and the smallest shaft, the shaft being larger than the hole), and the transition fit, covering intermediate cases.

Though not recommending terms such as push fit, etc., which have no exact numerical meaning, the British rules indicate their approximate applications in the tables of the report. The German equivalents of the three classes are Bewegungsitz, Festsitz and Ruhesitz, but the terms Pressitz, Festsitz (which thus has a double meaning), Treibsitz, Schrumpfsitz, etc., correspond more distinctly to the English force fit, drive fit, keying fit, shrink fit, &c.

Numerical values for the different qualities of shrink fits and for the races of roller bearings have not yet been fixed in Germany. The British tables give certain multipliers and ranges by the aid of which tolerances and allowances can be found for any diameter (within restricted ranges). This, however, is not done in Germany, and the gradations in the tolerances and allowances there progress as the cube root of the diameter, in England the steps follow the square root; the British tables, it should be noted, are calculated on both the British and the metric systems.

THE Fiat Company is said to be experimenting with a two-stroke racing engine of 9.15 cu. in. displacement. It has four cylinders, horizontally opposed in pairs, (called double flat twin), having two pistons per cylinder moving in opposition. One of these is the working piston or power piston while the other is a reciprocating distributor.

EDITORIAL

Speeding Up City Traffic

TRAFFIC congestion is becoming a serious problem to automotive manufacturers because the increasing difficulty of operating a car conveniently, particularly in cities, is already a factor in sales resistance and promises to become more important in the future.

Many types of control systems have been devised but few have lived up to the claims made for them. The synchronized control of a number of street intersections from a central station seems to be highest in favor at present. Its main disadvantages, and they are serious, are that on few streets is traffic sufficiently uniform to make synchronized control satisfactory, and traffic on intersecting streets varies so widely that no one arrangement will prove satisfactory for all. This causes cars to be held up at a number of corners where there may be no cross traffic to permit passage of cars over the one or two intersections that bear heavy traffic.

The recent installation of a traffic system in the Chicago Loop District designed to move cars through the section without any traffic holdups will bear watching. After two months of operation it is said to have speeded traffic from 25 to 50 per cent. A similar plan adopted for a street where there is no trolley line is in operation on Sixteenth Street in Washington. Here the lights are tied up in two block series. Starting at the beginning of the streets the first two blocks are green, the second two red, the third two green, etc. It is claimed that a car running at 22 miles per hour (the regular speed limit) can cover the entire length of the street without stopping and without interference from cross-town traffic.

Both of these plans and similar systems based upon the principle of progressive movement of traffic used in them, if longer experience bears out the promises made by present results, may be a partial solution of the traffic problem if and when adopted by other cities. Under present conditions both experiments are of uncommon interest.

Don't Read the Wrong Signs

BUSINESS trend figures are useful just insofar as they are interpreted correctly. Retail sales figures, not production statistics, show how demand is keeping up and retail demand is the basis of continued sales.

C. F. Hughes, financial observer of the New York *World*, points out that "Right up to the collapse in 1920 there was no hint from bank clearings, production or employment that a major slump was near at hand. Yet all this data is being used now to bolster up sentiment with respect, not only to the present, but to future conditions." This is a thoroughly sane observation.

At present there are plenty of good indices to indicate that conditions are sound without resorting to use of illogical data. Naturally high production doesn't prove that high production will continue. Future production must be determined in terms of unfilled orders, retail stocks and retail demand.

S. A. E. Vice-Presidencies

APPOINTMENT of a vice-president representing operation and maintenance in the Society of Automotive Engineers is being urged by a number of members. It is proposed at the same time that the vice-president representing stationary engineers be eliminated from the roll of officers because of the almost complete inactivity in this department.

The second part of the proposal ought to meet with almost unanimous approval. There seems to be little question, moreover, as to the growing importance of the operating and maintenance group in the Society. Not long ago the constitution of the Society was so amended as to permit and encourage membership from men engaged in these branches of the industry. A considerable part of the program of several Sections is devoted to the interests of this group and receives a very considerable support from it.

There are those who feel that operation and maintenance, while vitally important from the standpoint of the industry as a whole, do not properly form a part of the field to be covered by an engineering society, except insofar as those problems are related directly to the design and construction of the motor vehicle. There is much to be said on this count, yet that particular phase of the question really was decided so far as the S. A. E. is concerned when the constitution was altered to encourage memberships from operating and maintenance groups.

This being the case, it seems logical that this group should have adequate and proper recognition in the counsels of the Society. Whether the appointment of a vice-president representing operation and maintenance is essential to such recognition is the question which must be thrashed out. The other vice-presidencies represent particular products this one represent a vocational alignment. In that sense it would require a departure from past classifications.

The operating and maintenance membership of the Society is growing in importance so rapidly that the installation of a vice-president representing this group might be entirely proper, but it is highly desirable that the possible effects of such action on the whole official structure of the Society be fully discussed before any action be taken.

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The thought is entertained that despite unfavorable early spring weather sales have been better than last year at this time, and that 10 days or two weeks of fine weather would create a demand for new cars of record proportions. With good weather the true situation with regard to the immediate future of the industry will be outlined clearly. If buying develops in satisfactory volume it is likely that operations will be continued on much the present basis for the remaining months of the second quarter. With the new models of the later year business in that period may be expected to attain a volume in keeping with normal enthusiasm arising from new presentations.

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Victoria	2790	....
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Plan International Standards Program

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The Plenary Assembly, composed of delegates of all national bodies, will be the chief executive body and an Administrative Council will control finance and administrative matters. An effort will be made to secure from the International Electrotechnical Commission joint action towards a unified organization.

The conference here was called by the American Engineering Standards Committee, C. E. Skinner, chairman.

Beaney Licenses Tire Flap

NEW YORK, April 26—Beaney Rubber Co., 117 West 64th Street, New York City, has decided not to manufacture the Beaney tire flap, but to license representative tire concerns to make and sell the flap under Beaney patents. These concerns have already taken out such licenses:

Lee Tire & Rubber Co., Conshohocken, Pa.; Kelly-Springfield Tire Co., 250 West 57th Street, New York City, and Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ontario, sole distributor for Canada.

Superior Building Plant

BOULDER, COLO., April 28—A new factory is being constructed here by the Superior Metal Products, Inc., for the manufacture of "Neverslip" tire chains. The first unit of the factory is a one-story building 50 x 100 feet with a saw tooth type of roof.

According to plans of the company, production will start between June 1 and 15. The schedule for the first twelve months calls for 50,000 sets of "Neverslip" chains, which are especially designed to eliminate side skidding.

Organize for Plane-Building

KANSAS CITY, April 24—A new aeroplane manufacturing company, the American Eagle Aircraft Co., has been organized in this city with headquarters at Richard's Field. Their first plane was test-flown a short time ago with a very creditable performance. The planes manufactured by this company are equipped with Curtiss OX5 engines and are built to sell at $2445 complete, ready to fly away.

Yellow Truck Will Have New Factory

DETROIT, April 24—Property acquired in the town of Birmingham, adjacent to Detroit, by the Yellow Truck & Coach Mfg. Co., division of General Motors Corp., will be the site of a new general manufacturing plant, according to an unofficial statement by General Motors executives. The plant will be an addition to present plants in Chicago, Moline, Pontiac and Detroit and is required to meet expanding operations of the company.

The official statement on the building of the new plant, soon to be made, is expected to show that the new factories will be general manufacturing buildings in which entire chassis will be built and assembled both for taxicabs and trucks and coaches. There is also a probability that engines also will be manufactured there in addition to the continuance of motor operations in the present plants.

Soviet Engine Orders High

WASHINGTON, April 29—The largest foreign order placed in the United States in February for aircraft engines was by Soviet Russia, the Department of Commerce announces. Of the total of $57,124 worth of airplane engine exports for the month. Russia's order amounted to $48,068.

Developments of the Week in Leading Motor Stocks

NEW YORK, April 28—The outstanding feature of the week's trading in the motor shares on the Stock Exchange was an advance of more than 10 points in General Motors common to within two points of its highest price this year at 131¼. The advance was in anticipation of the corporation's earnings statement for the first three months of the year which showed some striking gains over the corresponding period of 1925. With the publication of the figures the stock receded slightly from its highest levels but maintained a strong undertone. The remarkable display of earning power helped to explain the underlying strength which has characterized General Motors common during the reactionary market in the motors this year.

There was good buying of General Motors both of a speculative and investment character. The speculative buying was based upon the prospect that a liberal extra dividend is likely when directors meet early in May, which should put the stock still higher and the investment buying on the intrinsic values and large earning power of the corporation. Brokerage circles expect that directors will declare an extra dividend of $2 or $3 a share in addition to the regular quarterly payment of $1.75 at their next meeting, as the first of the extra dividends to be paid this year, which should ultimately bring total payments to last year's disbursement of $12 a share on the common.

Other motor stocks were strong in sympathy with General Motors but their gains were somewhat smaller. Hudson rallied to above 70 but later lost the larger part of its gain.

Numerous quarterly reports of earnings for the first three months of the year made their appearance which had a stimulating influence on the shares as indicating a highly prosperous state in the industry. Among these Studebaker's report proved a surprise. The corporation showed a gain of more than 10 per cent over last year's net with a balance equal to $2.08 a share against $1.84, indicating a comfortable margin above the quarterly dividend payments of $1.25 a share. The stock responded with an advance to above 52.

Pierce-Arrow also showed a larger gain in earnings than had been expected with a balance 60 per cent larger than in 1925 leaving earnings $3.28 a share for the preferred stock on which dividends of 8 per cent annually are in arrears to the extent of $4,000,000.

After scanning these reports, Wall Street concluded that some of the sudden bearishness over the current condition of the motor industry which followed the publication of Hudson's first quarter statement earlier in the year was hardly justified. However, some of the bearish gossip continued, with rumors of impending price-cuts persistent. These rumors found some consolation in the announcement that the Franklin company had made sharp downward revisions in the prices of its cars, but they were not considered significant in well-posted quarters.

The bearish view taken of the earnings statements was that from now on they will not show up, except with one or two possible exceptions, as well in comparison with 1925. This is considered due to the fact that motor companies began to show their large earnings after the first quarter last year so that comparisons for the first quarter are being made with a subnormal period last year which has been to the advantage of this year's results.

Some of the accessory companies' earnings for the second quarter did not come up to expectations. This was particularly true of Stewart-Warner whose net, although slightly higher than in 1925 at $2.25 a share against $2.17 was nevertheless considerably below earlier estimates. Hayes Wheel report was also disappointing and the fact that directors omitted the extra dividend of 25 cents a share quarterly which had been paid on this stock the past nine months caused some selling which brought the stock to a new low for the year at 34⅛.—E. S.

General Motors Has Record First Quarter

Earnings $40,644,576, Against $18,903,489 in Same Period a Year Ago

NEW YORK, April 26—In the first quarter this year, General Motors Corp. attained its highest record of quarterly earnings. Net earnings for that period were $40,644,576 compared with $18,903,489 for the first quarter last year, an increase of $21,741,087 or 115 per cent.

In the 1926 quarter earnings is included $5,789,760 as representing the undivided profits of subsidiary operations in excess of dividends received.

After deducting dividends on the preferred stock, amounting to $1,910,634 there remains $38,733,942, equivalent to $7.50 per share on the common and comparing with $16,993,129 or $3.29 per share for the 1924 quarter.

Extra Dividend Rumored

The fact that the $7.50 per common share earnings in the first quarter alone this year exceeds the $7 which is the regular annual rate of common dividend gives rise to the report that an extra dividend may be declared when the directors meet in the middle of May.

Retail deliveries to consumers by General Motors divisions in the first quarter amounted to 224,720 cars, an increase of 65.5 per cent over the corresponding period last year. This constitutes a new record of retail deliveries for the first quarter.

Alfred P. Sloan, Jr., president, says that all divisions are in excellent operating condition and practically all are enjoying a record volume of business. As outstanding developments in the first quarter he cites favorable reception of the Pontiac and the rapid growth in sales volume and profits of the Delco Light Co., manufacturer of the Frigidaire line of electric refrigerators.

On March 31 General Motors cash in banks, government securities, temporary loans and marketable securities amounted to $136,899,249.

Rover Lowers Prices

LONDON, April 12 (*by mail*)—The Rover Co., Ltd., Coventry, has cut prices of the 14-45 hp. model (four cylinders 75 x 120 m.m., four-speeds and four-wheel brakes), £75 to £100. Examples of the new and old prices, the latter given in parenthesis, are as follows:

Five-passenger all-weather £485 (£560); Weymann type sedan £585 (£660); coachbuilt sedan £685 (£760); sports model four-passenger £660 (£760).

World Bestos Moves

NEW YORK, April 23—The World Bestos Corp. and Monogram Lens Corp. have moved their executive offices from 12 Vanderbilt Ave. to the plant at 52 Cortland St., Paterson, N. J.

PROFITS BETTERING MARKS OF YEAR AGO

NEW YORK, April 27—First quarter earnings thus far made public, including five in the car manufacturing and five in the accessory field, offer opportunity to compare business in the automotive industry this year with the same period in 1925.

Reports issued by General Motors Corp., Packard Motor Car Co., Nash Motors Co., Jordan Motor Car Co. and Hupp Motor Car Corp. show net earnings of $49,173,622 compared with $24,142,874 in the 1925 quarter, a gain of $25,030,748 or 103 per cent.

First quarter reports by Martin-Parry Corp., Stewart-Warner Speedometer Corp., Briggs Manufacturing Co., Hayes Wheel Co. and Eaton Axle & Spring Co. show net earnings of $4,703,483 compared with $4,073,021 in the 1925 quarter, an increase of $630,462 or 15 per cent.

Traffic Managers Oppose I. C. C. Regional Plan

DETROIT, April 26—Traffic managers of the National Automobile Chamber of Commerce at the April meeting here condemned pending legislation in Congress that would make appointments to the Interstate Commerce Commission a regional matter. It is felt that such an arrangement would tend to weaken the personnel and effectiveness of the commission as compared with the present plan of presidential appointments subject to confirmation by the Senate.

The meeting voted to support the National Industrial Traffic League in favoring adequate public representation in any new plan of handling wage disputes.

New Kelly Truck

SPRINGFIELD, OHIO, April 26—The Kelley Springfield Motor Truck and Bus Corp. is to put into production a ton and a half delivery truck. It will be made along the same lines as the Kelly truck and it will have standard equipment with starter, generator, and magneto. The new delivery truck will have a closed cab and pneumatic tires. The car will have a speed of 40 miles.

Finds Battery Sales Good

CAMDEN, April 26—Herbert Lloyd, president of the Electric Storage Battery Co., says that automobile manufacturers are contracted ahead for their supplies of batteries in about the same degree as is customary at this season, and that replacement business in batteries for automobiles is also good. The past winter was the company's best in sales of batteries for radios.

At the annual meeting directors were reelected.

$5,990,489 Dodge Income for Quarter

Sales Earnings Higher Than for First Three Month of 1925

NEW YORK, April 27—Increased sales in the first quarter of 1926 are reflected in the statement of Dodge Brothers, Inc., just issued. Consolidated net earnings for the company and its subsidiaries were $5,990,489, against $6,357,182 in the same period last year. The latter figure, however, included $644,632 realized through the sale of idle real estate.

Earnings from sales in the first three months this year aggregated $6,319,698, against $5,977,569 in the corresponding period of 1925, while other earnings amounted to $339,596, compared with $379,613 in the first three months of last year, making total earnings $6,659,294 and $6,357,182 respectively.

From the first quarter earnings of 1926 must be deducted $668,805 as earnings accrued to minority interests in Graham Brothers, but after April 30, all such income will belong to Dodge Brothers, because of the puchase as of that date of the remaining 49 per cent of Graham stock.

Acquires Planator Assets

ROCKFORD, ILL., April 29—The Price-Hollister Co. announces it has acquired all physical assets, patents and good will of the Planator Gear Shift Co., of Los Angeles, and that this gear shift for Ford cars and trucks will be manufactured in the Rockford plant, in addition to the Jumbo line of sliding-gear transmissions. Tooling up for the new line is being completed and a production schedule of 10,000 Planator units per month is planned to take effect May 1.

This latest addition to the Jumbo line will be called the Jumbo-Planator gear shift for Fords and will be handled by the present list of Jumbo distributors.

Ansted Properties to be Sold

CONNERSVILLE, IND., April 28—plant and other properties of the Ansted Engineering Co. will be sold here May 11, 12 and 13, by order of the receivers. Samuel T. Freeman & Co., of Philadelphia and Boston, are the auctioneers. The Ansted company made engines and clutches, and the factory equipment includes a varied line of machine tools.

Willys Six Sales Up

TOLEDO, April 27—Willys-Overland, Inc., sales of sixes for the first quarter are considerably in excess of sales for the same period last year. Willys-Knight sales show an increase of 130 per cent and Overland sixes a gain of approximately 50 per cent. Dealer stocks, according to the company, are the lowest in history for this time of the year.

Vane Urges Dealers to Sanity and Caution

Sees No Danger to Industry in Wall Street Upheaval if Prudence is Used

ST. LOUIS, April 28—The need for sanity and caution in the face of the "Wall Street upheaval" is stressed in the April Bulletin sent out to the membership of the National Automobile Dealers Association by General Manager C. A. Vane.

"There is nothing in the Wall Street situation to upset any automobile dealer who is properly organized," Mr. Vane writes, "but at the same time the next few months are periods for caution, judgment and continued effort. There is no reason for any dealer being stampeded in any direction." He continues:

The disturbance in Wall Street, was inevitable, just as deflation of numerous gigantic real estate bubbles was inevitable. But the automobile dealer can do many things to protect himself through the next few months, even against a general psychological depression that might be imposed upon him by the easily influenced public. The first is to realize that even if 1926 business shouldn't be as large as 1925, there's still going to be a good, substantial business ahead. Prudence would direct, though, that the dealer take steps to keep his stocks and his capital as liquid as possible.

First check back over the deliveries of last year. Find out where 1926 stands with relation to 1925. Keep your incoming shipments equalized with your deliveries. No manufacturer who has his own best interests at heart is going to ask dealers to load automobiles with no prospect of selling them. Keep your time sales on a safe basis—third or more down, twelve months or less to pay. Get your service station in shape to handle repair business.

Conservative policy advocates among motor vehicle manufacturers, according to the N.A.D.A. manager, are basing their production programs for the next five years on the belief that the normal motor vehicle market in the United States justifies the production of an average of 3,000,000 motor vehicles a year. "Of course," he says, "being good business men, they have equipped their plants so that they can take advantage of every sale over this figure that they can obtain. But they are not risking the security of their plants on any high hopes that four and one-quarter million or five million units is a normal production."

Lay Plans for Service Sections of 1927 Shows

NEW YORK, April 29—The special Service Equipment Committee of the Motor and Accessory Manufacturers Association met at association headquarters today with Neal G. Adair, manager of the Educational Department, and discussed plans for a distribution survey and a tentative program for the service equipment sections of the two national shows next January.

This program consists of what service equipment manufacturers would like to do at the shows, and before final action is taken it will be discussed with Samuel A. Miles, manager of the shows, when he returns from his automobile tour of France.

The Service Equipment Committee includes R. W. Procter of Black & Decker Mfg. Co., Fred G. Wacker of Automobile Maintenance Machinery Co., H. M. Smith of Manley Mfg. Co., Martin E. Goldman of the Forest Electric Co. and B. M. Asch of Asch & Co.

Reeves Hits Bonus Plans in Financing

NEW YORK, April 27—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, addressing a recent meeting of the Auto Finance and Credit Men's Association here, emphasized the necessity of "standing pat" on the time payment standard of one-third down and 12 months to pay. He believed that any departure from that standard would result in merely a slight temporary gain which would be out of all proportion to the harm inflicted on automobile financing generally.

Asked for his opinion regarding bonuses in connection with financing plans, Mr. Reeves expressed the belief that such arrangements, adding to the cost, were regrettable. In this more or less formative stage of automobile financing, several competitive methods are being used to obtain business, and these methods will probably disappear as financing becomes more stabilized. One such practice is that certain factories offer bonuses, or other methods, designed to make it easier for the dealer to deal with the home office in financing plans, and some non-factory financing houses are using extra commissions to obtain business.

C. C. Hanch, general manager of the National Association of Finance Companies, also read a paper before the association.

Electric Truck Show Opens

NEW YORK, April 28—Seven truck manufacturers, five battery manufacturers and eight accessory manufacturers are exhibiting at the sixth annual electric truck show which was opened by the New York Edison Co. on April 26 at its Irving Place and 15th Street showroom and continues until May 1.

Among the charts shown at the exhibition is one showing how the American Railway Express Co. saved $96,000 worth of floor space by replacing 168 wagons and 300 horses with 84 electric trucks.

To Show Electric Trucks

NEW YORK, April 28—The electric truck committee of the National Automobile Chamber of Commerce at a meeting today laid plans for a joint exhibition, open to non-members as well as members, at the convention of the National Electric Light Association which opens at Atlantic City May 17.

Will Apply McKenna Duty to U. S. Trucks

Growing Business in Britain Threatened by Levy of 33 1/3 Per Cent

NEW YORK, April 27—Announcement by Winston Churchill, British Chancellor of the Exchequer, that the McKenna duties will be extended to imported commercial vehicles is regarded here as of serious import to American manufacturers of trucks for export.

Since the war there has been no British import tariff on commercial vehicles. Year before last the Labor Government removed the 33 1/3 per cent McKenna import duties on passenger cars. Last year this duty was restored but commercial vehicles continued to come in free of duty.

Under these conditions divisions of the American truck manufacturing concerns have built up a growing business with the United Kingdom. Two years ago 703 trucks were exported from the United States to England, Scotland and Ireland, and 1264 were exported from Canada. In 1925 truck exports from the United States to the United Kingdom increased to 4322 and Canadian exports to 2008. Thus total American and Canadian truck exports for the United Kingdom increased from 1967 in 1924 to 6330 in 1925, a gain of 4363, or more than 200 per cent.

On first thought it might seem that the McKenna duties on commercial trucks would reduce this class of American and Canadian exports for the United Kingdom to a minimum, but although it is admitted that the duties would impose a severe sales handicap, it is thought that British demand for American light trucks will probably hold up well.

American service station and garage equipment and accessories shown to be intended for use on trucks have also been admitted to England free of import duty. Late cable advices from London now bear the news that the McKenna duties are also to be imposed upon these classes of American products.

Auburn Nets $273,000 in First 1926 Quarter

AUBURN, April 29—The Auburn Automobile Co., for the first quarter ended March 31, 1926, earned $273,000 after taxes and all charges, according to the balance sheet. This is equal to $4.05 per share on the 67,572 shares of common stock outstanding and equal to the entire year's dividend requirements plus the dollar extra paid on the stock as of April 2. Net earnings for the first quarter of 1925 were $38,000.

The company's assets total $5,002,847; current assets are $3,720,722 and current liabilities $896,000; capital is $1,689,000 and surplus, $1,573,000. No bank loans are outstanding.

Men of the Industry and What They Are Doing

Stambaugh Heads Service Promotion for Oldsmobile

T. H. Stambaugh has been appointed service promotion manager of Olds Motor Works, and will work under the direction of D. S. Eddins, general sales manager, under a new plan of correlating the sales and service departments.

Mr. Stambaugh is a native of Lansing. After a year with Oldsmobile, he spent three years in banking and then joined the Maxwell Motor Co., working both in the factory and as field service man. After holding several positions with the General Motors group, he was assistant to the general manager of the Flint Motor Co. before coming again with Oldsmobile.

Brownyer Goes to Kelly

Nelson R. Brownyer, chief engineer of the Gotfredson Corp. for the past five years has resigned to accept a position as motor coach engineer for the Kelly Springfield Truck and Bus Corp., Sprinfield, Ohio. His experience with Gotfredson included a great amount of experimental and research work pertaining to motor bus design. Mr. Brownyer will take up his new duties at the Springfield plant about May 1.

Olds Central Trust Head

R. E. Olds, chairman of the board of Reo Motor Car Co., has been named chairman of the board of the new Central Trust Co., of Lansing. Other officers also identified with the automotive industry of Lansing are J. Edward Roe, first vice-president and Richard Scott, temporary treasurer.

Nixon and Schurrier Arrive

C. B. Nixon and M. Schurrier, representing Leyland Motors, Ltd., of England, have arrived in this country to spend several weeks studying bus manufacture and especially the development of the six-wheel bus type. The larger part of the Leyland business is the manufacture of traction buses.

The visitors believe that because of the reduced preferential duties the new Canadian import tariffs on automobiles will work to the advantage of British car manufacturers.

Tire Producers in Canada Hit by Tariff Reduction

MONTREAL, April 28—Canadian tire makers are now threatened with the loss of a large part of their car equipment business. All the automobiles made in Canada for the export trade were equipped with Canadian tires, and certain firms obtained around 50 per cent of their total business from this source. The upheaval in the automobile business will adversely affect their output. Import duties on tires, however, are not reduced under the new budget.

FRENCH PRESIDENT OF BRIGGS MFG. CO.

John H. French has been elected president of Briggs Mfg. Co., succeeding Walter O. Briggs, who becomes chairman of the board. At a meeting of directors in Detroit this week other officials were elected as follows: H. C. Maise, first vice-president; M. L. Briggs, second vice-president; O. Pegau, vice-president in charge of manufacturing; W. P. Connolly, treasurer; H. W. Griffith, secretary and L. A. Lark assistant secretary and assistant treasurer.

The new president of Briggs was formerly president and general manager of the Michigan Stamping Co., which was taken over by the Briggs company in 1923. Since the consolidation Mr. French has been a director and second vice-president of Briggs and during the past year has been first vice-president and general manager.

Glynn Heads Metropolitan S. A. E.

F. K. Glynn of the American Telephone & Telegraph Co. is the new chairman of the Metropolitan section of the Society of Automotive Engineers. Other officers elected for the ensuing year are C. B. Veal, Manly & Veal, vice-chairman; E. F. Lowe, K-T Products Co., treasurer, and H. M. Rugg, Vacuum Oil Co., secretary.

Unwin Leaves Hinkley

B. V. Unwin, sales and advertising manager of Hinkley Motors, Inc., has resigned, effective April 30. Mr. Unwin is well known in the engine and truck branches of the industry. Previous to his Hinkley connection he was sales manager of the former J. C. Wilson Co. and before that had been connected with the Detroit Engine Works, one of the pioneer engine companies. He has not made any announcement as to future plans.

Quinn Off for Europe

NEW YORK, April 24—Sailing on La France for a short vacation in Europe, H. T. Dunn, president of Fisk Rubber Co., said:

"Notwithstanding the backward spring Fisk's March sales were slightly in excess of March last year, and April looks as if it would exceed March, with profits on a relative basis. The best six months of the fiscal year, which ends October 31, are still ahead of us."

Flint Axle to Liquidate

DETROIT, April 28—Directors of the Flint Motor Axle Co. have voted to liquidate the company and Fred J. Weiss, president, and R. W. Selleck, a Flint bank executive, have been appointed receivers.

G. H. Ralls President of Gabriel Snubber Co.

George H. Ralls, formerly sales manager and general manager, has been elected president of the Gabriel Snubber Mfg. Co. to succeed Claude H. Foster, founder of the company, who is now chairman of the board of directors. The election of Mr. Ralls came as a tribute to the successful manner in which he directed affairs of the company as general manager.

Other officers elected were R. J. Ketz, treasurer and David Benjamin, secretary. R. J. Dickey is chief engineer in charge of production. The officers, together with J. O. Eaton and S. N. Kline, make up the board of directors.

P. E. Chamberlain Resigns

Percy E. Chamberlain has resigned as sales manager of the Marmon Motor Car Co. He joined the company last October. Mr. Chamberlain has made no announcement of his plans for the future.

Young Again with Sheldon

Jay Young, who since 1920 has been sales manager of the Willys-Morrow Co., Elmira, N. Y., has returned to his former connection, the Sheldon Spring & Axle Co. of Wilkes-Barre, Pa. From 1907 to 1920 he was eastern sales manager and he now becomes assistant sales manager. He will probably make his headquarters at Detroit.

Houser Leaves Yellow

Alfred C. Houser, for the past three and a half years advertising manager of the Yellow Truck & Coach Mfg. Co., has resigned as of May 1. Mr. Houser has acquired a partnership in the North Shore Buick Co.

Gregg to Discuss Aviation

S. E. Gregg, chief of the Transportation Division of the Department of Commerce, left here this week for a trip to California during which he will confer with business men concerning transportation problems. In California Mr. Gregg expects to meet with producers of aviation equipment with whom he will discuss commercial aviation.

Australia Sets Taxes to Pay for New Roads

WASHINGTON, April 15—South Australia has passed three laws to finance its road construction program, which is comprehensive and will require three years to complete, Assistant Trade Commissioner J. B. Foster at Melbourne informs the Automotive Division of the Department of Commerce. One act alters the motor vehicle taxation scale to a power-weight basis; one provides for licensing all animal drawn vehicles in the metropolitan area, and one for a tax of 3d. a gallon on motor spirit.

Exports, Imports and Reimports of the Automotive Industry for March of current year and total for nine months ending March, 1926

	Month of March				Nine Months Ending March			
	1925		1926		1925		1926	
	Number	Value	Number	Value	Number	Value	Number	Value
EXPORTS								
Automobiles including parts (total)	..	$31,645,875	..	$20,664	..	$167,215,987	..	$59,305
Electric trucks and passenger cars	8	15,476	9	21,051	99	143,504	71	114,680
Motor trucks and buses, except electric:								
Up to 1 ton	..	..	..	..	9,403	3,847,905	..	..
Over 1 and up to 2½ tons	998	1,197,812	1,039	1,381,345	4,555	6,005,013	8,980	11,393,746
Over 2½ tons	126	435,479	185	508,902	1,106	2,969,306	1,485	4,672,067
Total motor trucks and buses except electric	4,727	3,169,181	5,674	4,073,752	22,644	15,980,294	52,023	34,029,878
PASSENGER CARS								
Passenger cars, except electric:								
Value up to $500, inclusive	9,463	3,409,342	8,038	3,117,792	48,439	17,749,442	86,745	32,555,292
Value over $500 up to $800	5,723	4,056,390	6,632	4,516,306	31,986	22,629,555	45,245	31,908,412
Value over $800 up to $2000	..	..	..	..	22,761	26,749,809	..	..
Value over $800 up to $1200	5,494	5,669,036	5,683	6,045,128	12,843	13,475,867	45,668	48,251,647
Value over $1200 up to $2000	1,968	2,918,499	1,378	2,056,831	4,604	6,840,616	10,483	15,748,506
Value over $2000	605	1,621,779	547	1,503,193	2,943	8,193,424	3,795	10,408,351
Total passenger cars, except electric	23,253	17,675,046	22,278	17,239,250	123,576	95,638,713	191,936	138,872,208
PARTS, ETC.								
Automobile unit assemblies	..	4,810,250	..	6,236,703	..	25,123,116	..	33,944,683
Automobile parts for replacement	..	2,922,633	..	2,678,492	..	16,648,013	..	23,159,883
Automobile accessories	..	717,601	..	1,037,445	..	4,947,116	..	6,956,560
Automobile service appliances (n.e.s.)	..	349,899	..	664,634	..	2,583,597	..	4,713,008
Station and warehouse motor trucks	48	48,097	19	7,222	145	98,379	97	81,247
Trailers	77	26,294	164	52,649	504	179,295	769	279,032
Airplanes	21	127,120	2	1,300	41	277,781	33	326,125
Parts of airplanes, except engines and tires	..	20,405	..	4,873	..	101,165	..	69,784
BICYCLES								
Bicycles and tricycles	657	17,455	339	9,459	5,640	142,382	4,816	137,210
Motor cycles	2,494	533,503	2,906	631,368	13,656	3,085,834	18,077	3,920,055
Parts, except tires	..	118,434	..	183,448	..	1,093,828	..	1,306,176
INTERNAL COMBUSTION ENGINES								
Stationary and portable:								
Diesel and Semi Diesel	16	17,373	56	114,141	721	307,420	1,215	977,431
Other stationary and portable:								
Not over 10 H.P.	2,423	203,546	3,034	273,678	21,124	2,028,201	22,298	1,945,235
Over 10 H.P.	170	222,695	92	95,470	1,525	1,336,229	2,124	1,758,472
Automobile engines for:								
Motor trucks and buses	3,372	308,382	377	44,955	19,032	1,656,353	11,257	1,049,289
Passenger cars	12,261	1,677,407	20,167	1,924,382	35,185	4,495,281	84,629	8,719,136
Tractors	39	27,471	78	66,658	2,089	665,046	1,502	634,613
Aircraft	5	20,000	17	38,025	45	81,030	637	222,480
Accessories	..	440,772	..	443,663	..	2,479,079	..	3,005,672
IMPORTS								
Automobiles and chassis (dutiable)	29	52,414	44	91,953	389	636,731	571	811,752
Other vehicles and parts for them (dutiable)	..	83,823	..	4,733	..	525,582	..	461,6 6
REIMPORTS								
Automobiles (free from duty)	8	13,616	9	6,724	438	650,044	138	211,356

See Immediate Need for Saving of Fuel

WASHINGTON, April 29—If the United States is to continue its present use of oil and its by-products, the nation's petroleum resources must be conserved and technical research encouraged, speakers declared at a joint meeting here this week of six technical and governmental organizations.

Unless fuel engineers find cheaper production and distillation methods than are now used, William Taylor Thom, Jr., of the U. S. Geological Survey declared, operation of motor vehicles within the next decade will be beyond the price reach of the average consumer. He asserted that a synthetic fuel oil is coming, and pointed to alcohol as a possible replacement for gasoline in the engines of motor cars.

Julian D. Sears of the Geological Survey said that improved carburetors, lighter cars, higher compression engines and a general change in automobile engineering will enable twice as many cars as are now on the road to run on about the same amount of gasoline consumption.

Time Payment Indemnity is Distributor's Scheme

JACKSONVILLE, April 26—Under an arrangement made with the Royal Indemnity Co. of New York, every purchaser of a used car from the Martin-Nash Motor Co., of this city and Atlanta, Ga., who buys on the deferred payment plan, receives as part of his purchase an insurance policy which protects his payments as they come due.

In the event of the purchaser's accidental death, the policy will pay indemnity equal to the total unpaid balance, the car being turned over to the estate as completely paid for. In the event of disability resulting from accident or illness, beginning with the fifteenth day of disability, the policy will pay indemnity at the rate of the monthly payments as long as the purchaser is totally disabled or confined to the house under a physician's care, this to continue until the car is paid for.

Flint Plans Air Meet

FLINT, April 24—An air meet will be held here June 4, 5 and 6, with entries closing May 1, to include speed races, dead stick contests, pony express races and an "On-to-Flint" race. No admittance will be charged. Exhibition space will be furnished manufacturers of aeroplane models, parts, instruments and accessories also without charge.

Adopt Uniform Code

LOS ANGELES, April 29—Ten of the larger cities near Los Angeles have adopted the uniform code worked out by Dr. Miller McClintock, in charge of the Albert Russel Erskine Bureau.

Finds Buses Limit Railroad Charges

WASHINGTON, April 28—Motor bus competition is putting the railroads of the country between the devil and the deep blue sea, R. M. Van Duran, vice-president of the Chicago and Northwestern Railroad Co. early this week testified before the Senate Interstate Commerce Committee conducting hearings on the Robinson bill, providing for abolition of Pullman surcharges.

The railroad's position is this, he declared: "Freight shippers, will not stand for an increase in freight rates, as freight is now paying its own way. The freight shipper declares the railroad must charge higher passenger rates. This, however, is impossible in view of the steadily increasing competition which is coming in the field of motor bus transportation on the hard-surfaced roads which run along beside our rail lines."

The committee heard testimony that four persons out of every 100 who travel on the railroads of the United States, travel in Pullman coaches.

Change Huff-Daland Title

BRISTOL, PA., April 26—The name of Huff-Daland & Co., Inc., aeroplane manufacturer, has been changed officially to Huff-Daland Aeroplanes, Inc., according to an announcement made by Thomas H. Huff, president.

Studebaker Profits Up 12% in Quarter

Total for First 3 Months is $4,028,920 or $2.08 Per Common Share

SOUTH BEND, April 26—Net profits of the Studebaker Corp. for the first quarter of 1926 were $4,028,920.66 compared with $3,605,780.54 in the 1925 quarter, an increase of 12 per cent. This net profit remained after all charges, depreciation and reserve after taxes. Profits were at the rate of $2.08 per common share against $1.84 in the 1925 quarter.

First quarter sales were $37,397,451.49 compared with $35,205,221.24 a gain of six per cent.

Regular dividends of 1¾ per cent on the preferred, and $1.25 on the common were paid during the quarter and the remaining earnings of $1,548,145.66 were carried to surplus, which on March 31 amounted to $34,957,184.15 against $31,796,383.58 on March 31 last year.

Preferred stock to the amount of $155,000 par value was retired during the quarter, reducing the amount outstanding to $7,830,000.

Current assets on March 31 were $53,343,639.43 and current liabilities $13,449,795.19 compared with $52,152,131.45 and $12,819,858.95 on December 31.

During the first quarter this year 30,573 cars were sold, compared with 29,937 in the first quarter last year.

S. A. E. Issues Schedule of May Section Meetings

NEW YORK, April 28—Section meetings scheduled by the Society of Automotive Engineers for May include the following:

May 5, Milwaukee—"Maintenance with Fleet Operation," E. Wotton; 6, Detroit; 11, Pennsylvania—"Problems in Design and Construction of Universal Joints," C. W. Spicer; 14, Southern California—"Improvements Needed in Motor Vehicles to Render Them More Efficient," F. D. Howell, Eugene Power, P. H. Decker, William H. Fairbanks, E. W. Stewart, Donald W. Douglas, J. J. Canavan.

May 17, Chicago—"Gasoline Substitutes from Coal"—A. C. Fieldner; 18, Buffalo—"Coincidental Locks," C. B. Veal; 20, Detroit—"Coincidental Locks," C. B. Veal; 20, Metropolitan.

South Africa May Raise Duty

WASHINGTON, April 21—An increase in the import duty of automobile chassis is proposed in the new South African budget, just introduced in the South African Parliament, the U. S. Department of Commerce has been formed by Trade Commissioner Stevenson at Johannesburg. The new tariff would provide for an increase from 10 to 15 per cent ad valorem, on chassis used in connection with bodies built in the Union.

BUICK GETS ORDER OF CANADIAN FIRM

FLINT, April 26—An order for fifty Buick automobiles has been received by the Buick Motor Co. from the McLaughlin Motor Car Co., of Montreal, Quebec. The order is the first received by the company from Canada since the recent reduction in the import duty by the Canadian government.

In the belief of Harry H. Bassett, president and general manager of Buick, the Canadian tariff revision provides a splendid opening for the American automotive industry.

March Revenue Bill Reaches $11,926,195

WASHINGTON, April 29—Internal Revenue collections from the automotive industry for the month of March, 1926, amounted to $11,926,195.80 or $4,067,901.62 more than collections for March, 1925, which amounted to $7,858,294.18.

An increase of $27,161,297.58 also is noted in the collections from the automotive industry for the period from July 1, 1925, to March 31, 1926, as compared with the same period in 1925, when the collections were $84,346,764.25. The collections in the 1926 period were $111,508,061.83.

Itemized collections from the automotive industry show the following: In March, 1925, collections from "automobile trucks and automobile wagons" netted $460,541.68 as compared with $378,113.63 during March, 1926; from "other automobiles and motorcycles" in March, 1925, $5,748,939.17 as compared with $10,146,760.25 during March, 1926; from "automobile parts and accessories" in March, 1925, $1,648,813.33 as compared with $1,401,321.92 during March, 1926.

Employment at New High

TOLEDO, April 26—Employment in Toledo plants which take a weekly census reached a new high mark for the last four years this week when 1031 employes were added, bringing the total in 51 plants to 30,594. Last year the peak was reached in May when these same plants had 29,000 at work.

The Willys-Overland company has reported a big demand for the Overland light six, and the plant is operating at top speed.

Rice Discusses Exports

NEW YORK, April 30—H. H. Rice, of the General Motors Corp. and a director of the National Automobile Chamber of Commerce, discussed the export outlook from the executives' viewpoint before the National Farm Council at Charleston, S. C., last night. J. V. Lawrence of the N.A.C.C. was also at the meeting.

Steel Prices Down in Buyers' Market

With Full-Finished Sheets at 4.30, Other Lines Are Under Attack

NEW YORK, April 29—Full-finished automobile sheets are now quotable at 4.30 cents, Pittsburgh, $2 a ton below the price level in vogue a fortnight ago. The 4.40 cent quotation was maintained for many weeks in spite of price-cutting in black and other descriptions of sheets. Steel bars may now be had at 2 cents in single carloads, whereas a fortnight ago only large tonnage buyers could secure that price and smaller lots carried a 2.10 cent quotation.

The market for cold-rolled strip steel is in dispute. The leading iron and steel publication quotes the market at 3.50 @ 3.75 cents. Pittsburgh dispatches state that producers in that district insist that the market continues at 3.75 @ 3.90 cents. It is quite obvious that certain cold-rolled steel producers maintain 3.75 @ 3.90 cents as their asking price, the lower figure of the range applying to more attractive specifications and quantities, but in a market like the present one, devoid as it is of representative tonnage demand, the asking price of certain producers is by no means the whole market consideration.

When the demand for steel exceeds the supply, the price named by the producer is naturally the market. For the time being, buyers' views dominate the market far more so than do those of sellers, and, what is more, there is considerable secret price-shading going on. Purchasing agents who canvass the market closely are much better posted on this than the sales managers of individual steel companies. The steel market simply reflects in its tone the somewhat diminished demand.

Pig Iron—The market is dull on the basis of $19, valley, for foundry and malleable irons. Blast furnace interests are optimistic regarding the outcome of their petition for an increase of 50 per cent in the rate of import duty.

Copper—Little change is noted in the market. Copper producers would like to see somewhat higher prices, but console themselves with the thought that, if general deflation of price levels should ensue, copper would be the one metal not affected.

Tin—It develops that consumers bought freely when the market receded recently to 62⅝. Since then it advanced, and consuming interest is light.

Lead—Storage battery makers are covering only early requirements. To all appearances the market is easy, but there is not very much unsold lead in sight, and a change might come any day.

Zinc—Consumers are only attracted by bargain offers.

Most Plants Still Operate in Canada

Inventories Being Worked Off, and Some Companies Will Expand Activities

OTTAWA, April 28—Operations of most Canadian subsidiaries of American car manufacturing companies are continuing for the present on an inventory-depletion basis with indication that on clearing out of these the Canadian market will be supplied generally from United States plants. Meanwhile debate on the tariff reductions drags along, present indications being that a vote will be reached May 6.

Some hope is now held out for favorable modifications in view of the demonstrated injury to industrial districts. These changes would take the form of either reductions on imported unit parts or increased drawback for Canadian operations, and would restore manufacturing to much its previous standing.

Even without modifications, however, the Ford Motor Co., of Canada, will of course continue operations and Chevrolet assembling, at least in the General Motors group, will continue, and probably be extended so as to take advantage of the drawback provisions already in the tariff. Other extensions may be made by Buick, Dodge and Overland.

E. P. Clarkson, general manager of Dodge Brothers' factory at Toronto, has announced that the plant is closed because of the tariff situation. T. A. Russel of Willys-Overland says it is the duty of his firm to continue operations despite the action of the Government. The Durant plant is closed, it is announced, pending the clearing of the tariff air, while General Motors at Oshawa is continuing operations.

One hundred representatives of the Automotive Industries of Canada waited upon the Cabinet today to ask that the automobile tariffs be referred to the new Canadian Tax and Tariffs Commission.

Henry Ford Favors Tariff Reductions

FORD CITY, ONT., April 26—Following a declaration by Henry Ford that he was in favor of tariff reductions and that the Ford company would get along better with free trade, the Ford Motor Co. of Canada, Ltd., held a directors' meeting today when a financial report was issued.

Sales and income for the five months ended Dec. 31, 1925, were $16,191,141.96, an increase of $5,133,680.97 over the corresponding months in 1924. The profit for this volume of business, however, was only $974,316.85, due, according to W. R. Campbell, vice-president and treasurer, to manufacturing difficulties incidental to new models and to the development of operations in the Australian subsidiary plants. Output for the period was 26,885 cars and trucks, and 2298 tractors, an increase of 8423 and 838 respectively.

In the remaining seven months of the fiscal year profits will show a much better relation to the volume, Mr. Campbell said, though the effect of the tariff reduction in the largest sales months in Canada cannot now be estimated.

The balance sheet as of Dec. 31, 1925, shows cash of $2,269,819.75, receivables of $4,399,163.86 and inventories of $7,272,412.70. Total assets are $42,243,697.05.

All officers were reelected.

N.S.P.A. Arranges for Credit Service

DETROIT, April 28—National Standard Parts Association headquarters have just perfected arrangements with the National Credit Office operating Credographic Bureau at Cleveland, Ohio, to furnish a comprehensive credit service to association members.

E. P. Chalfant, executive vice-president of the N.S.P.A., states, "This arrangement will bring to the members at reduced cost a credit service built for the replacement parts industry. The bureau will operate as the credit department of the association and will be in a position to supply up-to-date information in printed form every month covering the following points: Inventory carried, annual sales, credit classification (excellent, good, fair, caution, hazardous), number reporting and amounts past due and how long.

"In addition there will be issued weekly lists of special reports written, copies of which may be obtained by subscribers on request, and the nature of these reports is such as will present a very clear picture of the credit condition existing. If a report is required on anyone not appearing on these weekly lists a 24-hour service is assured."

March Tire Exports Break All Records

WASHINGTON, April 28—All previous records for exports, both as to aggregate totals and as to unit values, were broken in March exports of tires and tubes, the Department of Commerce has just announced.

Total exports of rubber were $5,696,413, of which approximately half constituted tires and tubes. The new high unit value for March was $18.88 per automobile casing, as compared to $16 per casing for previous months since November, 1925. A total of 128,232 pneumatic casings, 14,044 tires and $177,336 of tire accessories and repair materials were exported.

Bucher of Lycoming Dies

WILLIAMSPORT, PA., April 28—Howard R. Bucher, traffic manager of the Lycoming Mfg. Co., builders of Lycoming engines, died in the Williamsport Hospital last week following an appendicitis operation.

Financial Notes

Hayes Wheel Co., for first quarter of 1926 reports net income after all charges and Federal taxes of $148,987, against $222,035 in the corresponding period of 1925, equal respectively to 61 cents and 95 cents earned on 197,044 shares of common stock.

Balance sheet as of March 31 shows current assets, including $1,624,793 cash, totaling $4,822,909, against $4,841,174 a year ago, and current liabilities $788,878 against $850,959.

B. F. Goodrich Co. has declared regular quarterly dividend of $1 payable June first to common stockholders of record May 15. C. E. Cook has been elected a director to succeed E. C. Shaw, retired. At the annual meeting other directors were reelected and the retirement of 11,880 shares was authorized, reducing the amount outstanding to $36,284,000.

Eaton Axle and Spring Co. for the first quarter for 1926 reports net profit $203,636 after charges but before taxes, equivalent to 81 cents a share on 250,000 shares of no par stock and comparing with $153,198 or 66 cents a share on 229,500 shares outstanding in the first quarter last year.

McQuay-Norris Mfg. Co. reports for 1925 net income of $175,655 against $30,103 in 1924, equal respectively to $1.76 and 30 cents earned on the capital stock. Balance sheet as of Dec. 31 shows current assets $1,013,291 against $932,160 at the end of 1924, and current liabilities $262,559 against $414,638.

Ajax Rubber Co. stockholders have approved an increase of capital stock from 500,000 to 1,000,000 shares. Directors and officers have been reelected.

Electric Auto-Lite Co. for first quarter 1926 reports sales $2,898,903, and net income before taxes of $671,219, equal to $2.68 a share on 250,000 no par shares.

Yellow Truck Reports $2,330,743 Net in 1925

NEW YORK, April 28—Yellow Truck and Coach Mfg. Co. reports net income of $2,330,743 in 1925 after depreciation, taxes and other charges. This compares with $2,742,408 for the Yellow Cab Mfg. Co., the predecessor company, in 1924. Allowing for the year's dividends on the $15,000,000 7 per cent preferred stock, the balance would be equal to 91 cents a share of $10 par value, earned on the combined 600,000 shares of Class B stock and 800,000 shares of common stock, comparing with $1.20 a share on the same basis in 1924.

Reed Displays Trophy

WASHINGTON, April 26—Albert S. Reed, winner of the Collier Aeronautical Trophy for 1925 has deposited the trophy in the Smithsonian Institution here for the year that he is entitled to retain it. A committee recently selected Mr. Reed's invention of a duralumin propeller as best fulfilling the the conditions for the year 1925. The Reed propeller is now used on most of the record breaking planes throughout the world.

G.M.A.C. Not in Favor of Publishing Terms

Always Leads to Public Seeking Maximum Allowed, Says Cooper

NEW YORK, April 27—General Motors Acceptance Corp. has distributed to all its employees a pamphlet entitled, "Constructive Credit Merchandising," which is signed by Curtis C. Cooper, president.

Mr. Cooper writes that the publication or advertising of credit terms is a mistake because it encourages the public to acquire "a thought of buying on the maximum terms offered," and because through such publication and advertising the "natural business instinct of the dealer to close a time sale contract on terms best suited to the purchaser's circumstances is throttled."

He argues that maximum terms usually become the minimum terms upon which the dealer can sell because the purchaser knows he can secure such terms from another dealer; hence the merits of the car are often secondary to the liberality of the credit terms in the purchaser's mind.

Should Seek Minimum

Mr. Cooper insists that without in any way restricting the salesman's ability to close a sale, an effort can be made to secure the most conservative terms adapted to the purchaser's circumstances. With the practice of offering maximum terms to every purchaser having had a fair trial, Mr. Cooper believes that the next step is for finance companies arbitrarily to restrict terms and he sees a trend in that direction. He would like to see all General Motors dealers adopt again the method and principles of credit selling they employed before the general introduction of fixed credit terms.

General Motors Acceptance Corp., he emphasizes, recognizes no fixed terms and believes that the dealer is always best situated to appraise the purchaser's credit. "The only credit terms we recognize as proper," he says, "are the ones developed with knowledge of the purchaser's circumstances and which are properly suited to them. Any other method is purely arbitrary, unscientific and must result in wasted credit.

"While we will take every opportunity to place the advantages of the GMAC plan before the purchasing public, we will publish no specific terms. These must be left for the dealer to outline."

Jefferson Cuts Prices

CHICAGO, April 29—The Jefferson Electric Mfg. Co., 501-511 S. Green St., announces a price reduction on its entire line of super-ignition automobile coils, to take effect May 1, and the appointment of G. W. Mears, formerly with United Motor Service, Inc., as representative in its Ohio and West Virginia territory.

A. E. A. URGES FAIR METHODS IN SELLING

CHICAGO, April 26—The Automotive Equipment Association, in amending its by-laws, has stressed fair trade as its keynote. The by-laws have been made to read:

"We discountenance manufacturers and manufacturers' representatives offering inducements to the salesmen of the jobber, either in cash prizes or gratuities of any kind, or under any condition, either with the consent of the jobber or the salesman's employer as to unwarranted interference with the sales force and the business of the jobber.

"We are unanimously and unequivocally opposed to any manufacturer offering special compensation of any type or kind in any way as an inducement to the jobbers' salesmen."

Credit Men Seek Further Data on Instalment Sales

NEW YORK, April 27—At the annual convention of the National Association of Credit Men, to be held here May 24-28, an effort will be made to determine to what extent merchants and manufacturers are forced by competition to merchandise goods on the instalment basis.

An association survey shows that about 57 per cent of the credit managers whose opinion was sought disapproved instalment selling, while the remainder entertained no hostility to it, but about 90 per cent believed that instalment selling had been carried too far.

J. H. Tregoe, executive manager, believes that survey should convince bankers, finance and acceptance companies that a revaluation of the instalment business is necessary to insure continuance of healthy business conditions.

Johnson, Head of Rolls Royce, Dies in England

LONDON, April 12 (*by mail*)—The death occurred here yesterday, from pneumonia after three days' illness, of Claude Johnson, managing director of Rolls Royce, Ltd., and instigator of the formation of the Rolls Royce Company of America. Johnson was the original secretary of the Automobile Club of Great Britain and Ireland, afterwards the Royal Automobile Club. He joined C. S. Rolls and F. R. Royce in the early part of the century in establishing the Rolls Royce Co., and to his commercial instinct and enterprise, in conjunction with the engineering ability of Royce, the success of the Rolls Royce cars is due.

Raise Star Six Price

PHILADELPHIA, April 26—Durant Motor Co. of New Jersey announces that the price of the Star Six touring car has been increased $30. This model which formerly sold at $695 now lists at $725.

Plant Changes Made by Pratt & Whitney

Factory Reorganization to Result in More Efficient Production System

HARTFORD, April 27—Pratt & Whitney Mfg. Co., builder of machine tools, small tools, gages, standards and special machinery, has completed reorganization of its plant on Capitol Ave., which has been in progress for more than six months.

One building has been set aside for the manufacture of airplane engines by the Pratt & Whitney Aircraft Co., of which Fred B. Rentschler, formerly connected with the Wright Aeronautical Corp., is president, and George J. Mead, an expert in aircraft design, is vice-president. The next step in the manufacture of these engines is one of development and refinement. New equipment has been ordered and it is expected that about 150 new employees will be added soon.

Pratt & Whitney Mfg. Co. has discontinued making its own forgings and is now buying castings from outside sources. The building formerly used for forging manufacture is now used by the maintenance department.

Old types of machinery and tools have been discarded and much new machinery and equipment added. About 19 departments have been moved from previous locations and consolidated in the interests of economy. A new production office has been established and the reorganization as a whole has resulted in considerable reduction in manufacturing costs, according to Clayton R. Burt, general manager. Sales supervision is now being handled from Hartford, with W. P. Kirk as general sales manager.

Hear New Bus to be Shown by International Motor

NEW YORK, April 26—Although no announcement has been made, it is understood that the International Motor Co. will show a new bus at the annual exhibition of the American Railway Association and Railway Supply Manufacturers Association at Atlantic City, June 9-16. Company officials will not say what this innovation is to be but they believe it will cause considerable comment in the automotive field.

According to Roy A. Hauer, manager of the general bus department, the company in its 2000 square feet of space will show an exhibit somewhat different from that usually shown at the October session of the A.E.R.A. At that time only buses and parts are shown but the June exhibit will also include trucks, tractors and trailers, with at least two buses.

The company will show a tractor and semi-trailer, such as are used by railways in short haul terminal-to-terminal freight movement.

450 H.P. Racer is Latest in England

LONDON, April 12 (*by mail*)—Captain Malcolm Campbell, who has held the mile and kilometer records, as recognized by the European Federation of Recognised Automobile Clubs, almost continuously since the war with his 12-cylinder 350 h.p. Sunbeam, is building a new racing car with a view to putting those records at well over 160 m.p.h.

It will have a Napier-Lion airplane engine, which is a 12-cylinder power plant with three blocks of four cylinders arranged as a W, with a bore and stroke of 5½ x 5⅛ in., giving it a total displacement of 1460 cu. in.; the rated horsepower is 450 at 2000 r.p.m., though the actual brake horsepower at that speed is 473. Captain Malcolm Campbell is planning a maximum speed of 180 m.p.h. without allowing for wheel slip.

Western Metal Builds

MILWAUKEE, April 26—Additional construction has been started by the Western Metal Specialty Co., 3020 Calhoun Place, Milwaukee, Wis., which will afford much needed production and warehousing space. The concern has recently booked an extensive contract for automotive stampings with a large automobile producer, which, with its other business in sheet metal products of various kinds is overcrowding the present plant. Julius J. Goetz is president, and William M. Gaulke, chief engineer.

Republic Earnings Higher

NEW YORK, April 21—Republic Motor Truck Co., Inc., for the calendar year 1925 reports net income of $181,970, against $46,055 for 1924.

Coming Feature Issues of Chilton Class Journal Publications

May—Automobile Trade Journal—Biggest Market Issue.

May 6—Motor Age—Sales and Service Reference Number.

Biflex Co. Occupies New Waukegan Plant Addition

WAUKEGAN, ILL., April 27—Biflex Products Co. is now occupying the new addition to its plant. The added unit will facilitate production and enable increased output.

One unit of the Biflex plant was destroyed by fire April 20, but there will be no interruption of deliveries of Biflex or Halladay bumpers to the trade, as the company has arranged to take care of all orders from the untouched part of the Waukegan plant or from the Halladay plant at Decatur, Ill..

New G. M. A. C. Branch

MILWAUKEE, April 26—A new branch of the General Motors Acceptance Corp., will be established immediately after May 1, it is announced. Representatives have been in Milwaukee for several weeks organizing a complete administration force and operating staff.

Copper Use at Peak

NEW YORK, April 21—More than 245,000,000 pounds of copper were consumed by the automobile industry in 1925, it is estimated by the Copper & Brass Research Association. This constitutes a record figure.

Fisher Buys Plant Site on Ohio River

SOUTH POINT, OHIO, April 26—The Fisher Body Corp., has taken an option on a tract of 40 acres on the Ohio River here, where the early establishment of a plant for the manufacture of automobile bodies is contemplated.

Officials of the Fisher corporation secured an option recently following a survey of the location by company engineers. Nearness to the iron and steel mills of Ashland and Huntington together with low costs of transportation on the Ohio as well as the favorable position as to railroads is the reason for the selection of the site. Another factor is the nearness to the coal supply of West Virginia and Kentucky. Plans for the plant will be announced soon.

Upholds Clymer Patent

CHICAGO, April 25—Judge Adam C. Cliffe, in the United States District Court for the northern district of Illinois, has held valid the Clymer windshield spotlight patent, No. 1,501,704, issuing a permanent injunction against Joseph T. Meehan, doing business as the Nonbetter Specialty Co., and Gerald G. Barry, enjoining them from manufacture, sale and use of infringing spotlights. The case was referred to Master Charles B. Morrison for an accounting of profits and damages.

Would Speed Navy Buying

WASHINGTON, April 22—Purchase of naval aircraft and aircraft engines or accessories for the Navy, without advertisement, would be permitted under a bill introduced by Representative Vinson of Georgia.

Calendar of Coming Events

SHOWS

May 25 — International Exhibition of Roads, Transport and Touring, Show Grounds, Argentine Rural Society, Palermo, Buenos Aires.

June 10-20—Third Annual Automobile, Motor Cycle and Cycle Exposition, Geneva.

July 28—First Peruvian Automobile Show, under auspices Peruvian Touring Club, Lima.

Sept. 7-10—6th Annual New Haven Machine Tool Exhibition.

Sept.—Fifth International Road Congress and Exposition, Milan.

Sept.—Automobile Show, Prague.

Oct. 7-17—Auto Salon, Grand Palais, Paris.

Oct. 21-30—Olympia Show, London.

Nov. 8-13 — Convention and Show, Automotive Equipment Association, Coliseum, Chicago.

Dec.—Show at Brussels.

End of 1926—Show at Berlin.

CONVENTIONS

May 6-8—National Machine Tool Builders Association, Providence, R. I.

May 10-13 — 14th annual meeting Chamber of Commerce of the United States, Washington.

May 13-15—American Gear Manufacturers Association, Tenth Annual Convention, Book-Cadillac Hotel, Detroit.

May 17-21—National Electric Light Association and Electric Truck Manufacturers Association, Atlantic City, N. J.

May 28-29—National Motor Grinders and Rebuilders Association, Indianapolis.

June 7-12—Annual United States good roads show and convention, direction United States Good Roads Association, Inc., and Bankhead National Highway Association, Santa Monica.

June 8-10—Automobile Body Builders Association with manufacturers' exhibit, Detroit, Hotel Statler.

June 14-19 — Automotive Equipment Association, Mount Royal Hotel, Montreal, Canada.

June 16-18—Thirteenth National Convention, Society of Industrial Engineers, Philadelphia, Bellevue-Stratford Hotel.

Oct. 4-8 — 45th Annual Convention, American Electric Railway Association and manufacturers' exhibit, Cleveland Public Auditorium and Annex.

Nov. 15-19—National Standard Parts Association convention and exhibit, Hotel Sherman, Chicago.

Nov. 16-18—National Tire Dealers Association, Inc., Memphis, Tenn.

RACES

May 10—Charlotte, N. C.

May 21-22—Tenth Annual Economy Run, Los Angeles to Camp Curry.

May 30-31 — 500-mile race, Indianapolis.

June 12 — Flag Day races, Altoona Speedway.

June 12-13—Rudge-Whitworth 24-hour stock car race, Le Mans, France.

June 27—French Grand Prix, Miramas Track, Marseilles.

Sept. 6 — Labor Day races, Altoona Speedway.

S. A. E. MEETINGS
National

June 1-4 — Semi-annual meeting, French Lick Springs, Ind.

Sept. 21-23 — Production Engineering meeting, Hotel Sherman, Chicago.

Nov. 16-18—National Transportation and Service meeting, Boston.